INSECTS OF MICRONESIA
Diptera: Psychodidae[1]

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INTRODUCTION

This is the first report of extensive collections of Psychodidae made in the Micronesian Islands. The psychodid fauna of Fiji, Samoa, New Zealand, and Australia have been studied by Satchell in 1950, 1953, and 1954; those of the Philippine Islands by del Rosario in 1936; and those of the Hawaiian Islands by Quate in 1954, but information on psychodids from other Pacific regions and the Asiatic mainland is very scanty.

The United States Office of Naval Research, the Pacific Science Board (National Research Council), the National Science Foundation, and Bernice P. Bishop Museum have made this survey and publication of the results possible. Field research was aided by a contract between the Office of Naval Research, Department of the Navy, and the National Academy of Sciences, NR 160-175.

The specimens were collected by J. L. Gressitt, R. J. Goss, C. W. Sabrosky, H. K. Townes, and others. I am indebted to the above organizations and individuals for making it possible to accumulate the psychodid material and making the collections available to me for study. My appreciation is also extended to Dr. J. L. Gressitt for the opportunity to participate in the comprehensive study of Micronesian insects.

The following symbols indicate the museums in which specimens are stored: US (United States National Museum), MCZ (Museum of Comparative Zöology), CAS (California Academy of Sciences), BISHOP (Bernice P. Bishop Museum), CM (Chicago Natural History Museum), KU (Kyushu University), and BM (British Museum of Natural History).

ZOOGEOGRAPHY

The Micronesian Psychodidae are represented by five genera in the two subfamilies, Trichomyiinae and Psychodinae. None of the genera are endemic to Micronesia, although one subgenus of *Telmatoscopus* is known only from

[1] This represents, in part, Results of Professor T. Esaki's Micronesian Expeditions (1936-1940), No. 105.
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there at the present time. However, it is premature to regard this group as endemic to Micronesia in the absence of extensive taxonomic studies on many other Pacific islands and in Asia.

Trichomyia, the only Micronesian representative of the Trichomyiinae, has two endemic species in Micronesia. Other species are widely scattered throughout the world, but are nowhere abundant. It also has two species in the Hawaiian Islands.

Brunettia is represented by three forms of a single species. The nominate form and nearest relative of the Micronesian forms is found in Fiji and Samoa, over 2,000 miles to the southeast of Micronesia.

Of the six species of *Telmatoscopus,* five appear endemic to Micronesia, while the remaining one, *T. albipunctatus,* is tropicopolitan in distribution. One of the species is assigned to a new subgenus and diverges considerably from the other members of *Telmatoscopus*. At the present time, this subgenus is known only in Micronesia, but too little information is available from other parts of the world to ascertain the limits of its distribution.

Trichopsychoda is also widespread, but never abundant. Two species have become established in Micronesia and are probably endemic.

Species of the genus *Psychoda* are the most abundant in Micronesia. There are 20 species and three subspecies present, 13 species and two subspecies which are apparently endemic.

Psychoda alternata is a common species in temperate and tropical regions. *P. rarotongensis* is known from widely separated localities in New Zealand, Hawaiian Islands, United States, and the West Indies. *P. quadrifilis* is found only in Micronesia and the Hawaiian Islands. *P. cochlearia* and *adumbrata* occur in Micronesia and Polynesia. *P. longiseta* and *acanthostyla* are Micronesian and Palearctic (Japan and Taiwan) in distribution.

The relationship of Micronesian Psychodidae with other faunal areas is obscure. The only nearby region where studies are complete enough to allow comparison is Australia and New Zealand and the slight affinity to those areas would exclude derivation of the Micronesian psychodids from there. The lack of knowledge of oriental psychodids prevents a comparison of this fauna with that of Micronesia.

The psychodids have been successful at island colonization. In an area with only 1,000 square miles of land, 28 species are established. Compared to the 78 species in North America, Micronesian psychodids are numerous. The comparison is not so striking as it may appear, since these flies are more abundant in tropical than in temperate climates, but in view of the relative land surface the number of species is still high.

A good deal of the success of these flies in the islands may be attributed to their introduction by man. Some species, as *Telmatoscopus albipunctatus* and

DISTRIBUTION OF MICRONESIAN PSYCHODIDAE

	Micronesian Island Groups										Other Localities
			Caroline								
	Bonin	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Kusaie	Marshall	Gilbert	
Trichomyiinae											
1. Trichomyia trukensis*						×					
2. T. palauensis*			×								
Psychodinae											
3. Brunettia biformis			×	×	×		×	×	×		Samoa, Fiji
4. Telmatoscopus maculalus*				×		×	×				
5. T. maculoides*				×			×				
6. T. daedalus*			×								
7. T. albipunctatus		×	×					×			Tropicopolitan
8. T. albipunctoides*			×								
9. T. (Minioceros) squamalatus*		×	×				×				
10. Trichopsychoda carolinensis*						×					
11. T. boninensis*	×										
12. Psychoda plaesia*	×		×	×							
13. P. hemicorcula*			×	×							
14. P. acutilamina*			×			×	×	×			
15. P. aponesos*			×	×		×	×				
16. P. cochlearia			×	×							Fiji
17. P. lucubrans*			×								
18. P. mediocris*			×	×							
19. P. parsivena*			×			×	×				
20. P. alternata	×	×	×	×		×	×				Cosmopolitan
21. P. acanthostyla		×	×	×							Formosa
22. P. ichthycerca*		×		×							
23. P. adumbrata			×			×					Samoa
24. P. yapensis*			×	×		×	×	×			
25. P. rarotongensis			×	×		×	×				U.S., West Indies, Hawaiian Is., Cook Is., Solomon Is.
26. P. quadrifilis quadrifilis					×	×	×	×	×		Hawaiian Is.
27. P. q. hespera*			×	×			×				
28. P. q. guamensis*		×									
29. P. ochra*			×	×		×	×	×			
30. P. gressitti*						×					
31. P. adyscheres*								×			
32. P. longiseta	×										Japan
33. P. allodapa*	×										
34. P. harrisi			×								Hawaiian Is., New Zealand, Australia

* Described as new.

Psychoda alternata, have a wide range of larval habitats, including plant materials such as fruit and vegetables, which are carried aboard ships. Their wide distribution with little geographical variation suggests that they have been largely distributed by commercial transportation.

Probably not all the psychodids reached the islands by human agency. *Trichomyia,* for example, could have rafted there since the larvae live in decaying wood. The general biology of *Telmatoscopus* is not entirely clear, but they do not seem to breed in materials commonly transported by man.

Noticeable gaps are present in the psychodid fauna, which is consistent with the general picture on oceanic islands. In continental areas, *Pericoma* is a dominant part of the psychodid fauna, and species of this genus rank in number with *Psychoda* and *Telmatoscopus.* However, the genus is absent from Micronesia as it is from other islands. The larval habitats are limited to streams and stream margins, which restricts the possibility of successful distribution over long stretches of ocean.

The Phlebotominae and Bruchomyinae (recently considered as a single subfamily) are also lacking in Micronesia and other islands. These groups are tropical and subtropical in distribution. Species of *Phlebotomus* are abundant in tropical continental areas.

SYSTEMATICS

Psychodids are small gnats with a dense covering of hair giving them the appearance of very small moths (fig. 1). Some are multicolored, but many are dull gray or pale brown. The wings are moderately broad to very broad with the longitudinal veins equally sclerotized. Cross veins are usually absent. The antennae are long and often have cupuliform whorls of hair on each segment. In nature psychodids are seen resting in shaded retreats, usually on the underside of leaves, in crevices of trees, under bridges, or other places where they are protected from the direct rays of the sun. At rest the wings are held rooflike over their body. They fly in short, jerky flights when disturbed.

The larvae (fig. 2, *a-c*) of the Psychodinae are distinguishable from other worm-like nematocerous larvae by the secondary annulations of the body and the tergal plates present on each annulus. In some instances, as in *P. alternata,* the plates may be absent on the anterior abdominal segments. The abdomen terminates in a cylindrical siphon tube which bears at its apex two pairs of conical projections fringed with long hairs in a fan-like arrangement. The head and mouthparts are complete and the head is nonretractile.

The pupae of the Psychodinae (fig. 2, *d-g*) are similar to many other groups of Nematocera, but differ from them by their simple thoracic respiratory horn, the ornamental fringe of spurs and hairs on the abdominal segments, and the quadrate shape, in lateral view, of the terminal segment.

Key to Micronesian Genera of Psychodidae

1. Radial sector four-branched, two veins between radial and medial forks (Psychodinae) 2
   Radial sector three-branched, one vein between forks (Trichomyiinae) .... **Trichomyia**

2(1). Terminal antennal segments not reduced in size, with internodes; apical segment with apiculis; varicolored species 3
   Terminal antennal segments reduced in size, without internodes; apical segment without apiculis; usually uniformly yellowish or grayish species.... 4

3(2). Wing with hairs arising only from veins, without iridescent scales; radial sector not pectinate; tenacula of male surstyle not clavate........ **Telmatoscopus**
   Wing with hairs and scales arising from veins and membrane, with iridescent scales; radial sector pectinate; most tenacula of male surstyle clavate or racquet-shaped........ **Brunettia**

4(2). Hairs and/or scales arising from membrane as well as veins........ 5
   Hairs arising from veins only........ **Psychoda**

5(4). Wing without scales........ **Trichopsychoda**
   Wing with dense covering of iridescent scales........ **Telmatoscopus (Minioceros)**



FIGURE 1.—Adult of *Psychoda* sp. (Drawing by Mrs. Carolyn Lee.)

Subfamily TRICHOMYIINAE

Genus **Trichomyia** Curtis

Trichomyia Curtis, 1839, British Ent. **16** (186) : 745.—Quate, 1954, Hawaiian Ent. Soc., Proc. **15** : 337.—Satchell, 1956, Roy. Ent. Soc. London, Proc. B, **25** : 147.

Type of genus: *Trichomyia urbica* Curtis (by monotypy).

Adult characters: Eyes round, without eye bridge, interocular suture absent; labellum bulbous, without teeth; palpus with three or four segments. Antenna with 15 or 16

segments, flagellar segments elongate pyriform or cylindrical, never nodose; sensory filament simple, rodlike; wing vestiture well developed, either hairy or scaly, confined to veins; Rs three-branched, R_5 absent, hence only one longitudinal vein between radial and medial forks; Sc forked, usually ending in C and R_1; Cu long, reaching approximately to level of middle of wing. Male genitalia rotated through 180 degrees; surstyle lamellate. Female genitalia with subgenital plate triangular, cerci ovoid; spermatheca small, hemispherical.

This group is easily differentiated from other Micronesian psychodids by the one longitudinal vein between the forks of the wing and the round eyes without eye bridges.

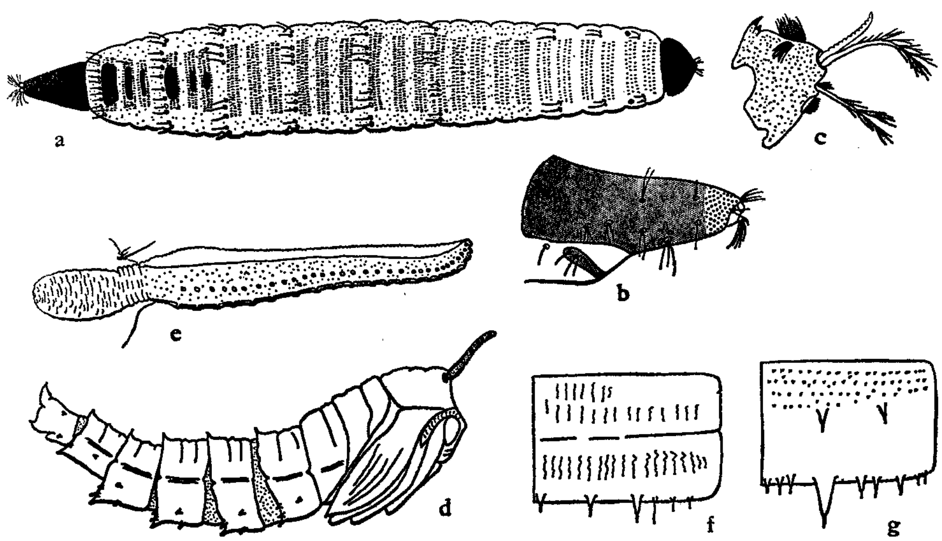


FIGURE 2.—*Psychoda alternata.* **a-c,** larva: *a,* dorsal view; *b,* siphon; *c,* mandible. **d-g,** pupa: *d,* lateral view; *e,* respiratory horn; *f,* abdominal sternite 2; *g,* abdominal tergite 2.

The genera *Sycorax* and *Trichomyia* constitute the subfamily Trichomyiinae, one of the more primitive groups of the Psychodidae. *Trichomyia* is the only member of the subfamily found in Micronesia and is less abundant than species of the Psychodinae. Nevertheless, the genus has been remarkably successful at island colonization, becoming established in the Carolines and perhaps other Micronesian islands as well as on the oceanic islands of Hawaii and the continental island of Madagascar.

KEY TO MICRONESIAN SPECIES OF TRICHOMYIA

1. Cu ending beyond level of medial fork; radial fork distad of medial by distance equal to 3 times width of cell R_3 at point of bifurcation; palpal segment 1 twice as long as 3..**1. trukensis**

Cu ending before level of medial fork; radial fork distad of medial by distance equal to width of R_s at point of bifurcation; palpal segment 1 little longer than 3 (6: 5) .... **2. palauensis**

1. Trichomyia trukensis Quate, n. sp. (fig. 3).

Male: Vestiture golden brown, brown on antenna and legs. Eyes separated by distance equal to eight facets at level of antenna; labrum shorter than palpal segment 1; palpus three-segmented, ratio of segments 6:4:3. Antenna with 15 segments; sensory filaments little longer than segments bearing them. Wing without scales; radial fork

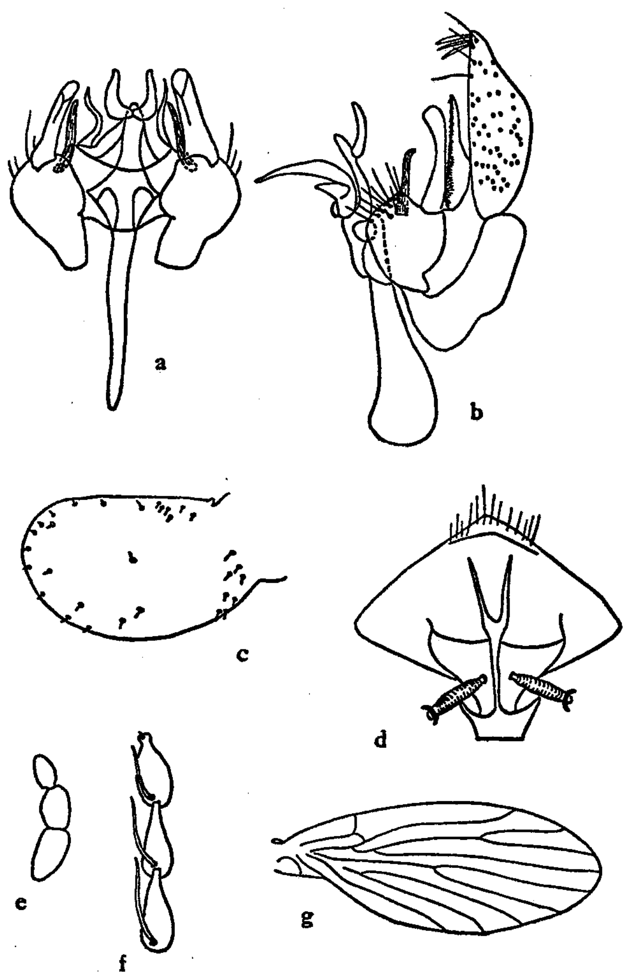


FIGURE 3.—*Trichomyia trukensis:* **a**, male genitalia, dorsal view, **b**, male genitalia, lateral view; **c**, female cercus; **d**, female subgenital plate and spermatheca; **e**, palpus, male; **f**, antenna tip, male; **g**, wing, male.

distad of medial fork by distance equal to 3 times width of cell R_2 at point of bifurcation; Cu ending little beyond level of medial fork. Genitalia as illustrated; surstyle with four or five spiniform tenacula.

Measurements: Holotype, antenna 1.0 mm.; wing length 1.2 mm.; wing width 0.5 mm.

Female: Similar to male. Wing narrower; spermatheca as illustrated.

Measurements: Allotype, antenna 1.1 mm.; wing length 1.3 mm.; wing width 0.5 mm.

Holotype, male (US 63981), Mt. Chukumong (Teroken), 80 m., Wena (Moen) I., Truk, light trap, Dec. 28, 1952, Gressitt. Allotype, female (US), same locality, Feb. 6, 1953, Gressitt. Paratypes (BISHOP, US), 12 males, 11 females, same locality, 32-390 m., Dec. 27, 1952 to Feb. 6, 1953, Gressitt.

DISTRIBUTION: Caroline Is. (Truk).

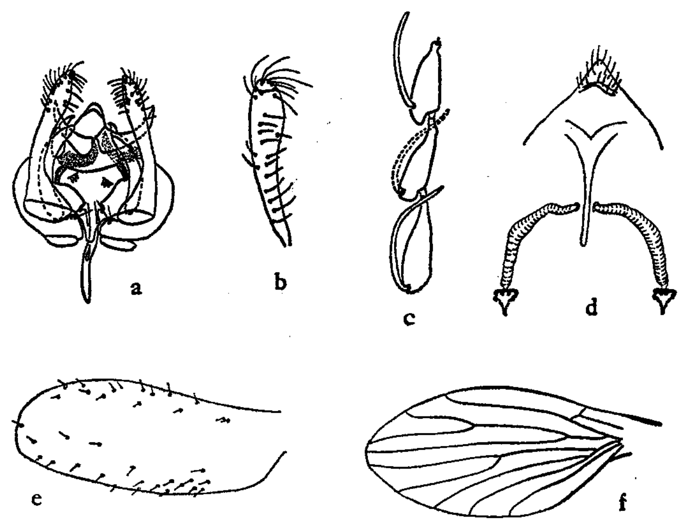


FIGURE 4.—*Trichomyia palauensis:* **a,** male genitalia, dorsal view; **b,** male surstyle, lateral view; **c,** antenna tip, male; **d,** female subgenital plate and spermatheca; **e,** female cercus; **f,** wing, male.

2. **Trichomyia palauensis** Quate, n. sp. (fig. 4).

Male: Vestiture golden brown, brown on antenna and legs. Eyes separated by distance equal to six to seven facets at level of antenna; labrum as long as palpal segment 1; palpus three-segmented, pit on anteromedial margin, ratio of segments 6:4:5. Antenna with 15 segments; sensory filaments about 1.5 times length of segments bearing them. Wing without scales; radial fork distad of medial fork by distance equal to width of cell R_2 at point of bifurcation; Cu ending before level of medial fork. Genitalia as illustrated; surstyle with number of bristles, but without tenacula.

Measurements: Holotype, antenna 1.1 mm.; wing length 1.1 mm.; wing width 0.5 mm.

Female: Similar to male. Wing narrower; spermatheca as illustrated.

Measurements: Allotype, antenna 1.05 mm.; wing length 1.1 mm.; wing width 0.4 mm.

Holotype, male (US 63982), Mt. Amiangal, Peleliu, Palau, light trap, Dec. 22, 1952, Gressitt; allotype, female (US), same data. Paratypes (BISHOP), three males, two females, same data as for holotype.

DISTRIBUTION: Caroline Is. (Palau).

The two species of *Trichomyia* are similar enough to indicate they originated from a common ancestor and hence evolved from a single introduction into Micronesia. The differences in the male genitalia, as well as characters mentioned in the key, show the distinctness of the two species.

SUBFAMILY PSYCHODINAE

Genus **Brunettia** Annandale

Diplonema Annandale, 1908, Asiatic Soc. Bengal, Jour. Proc. **4**: 353 (preocc.).

Brunettia Annandale, 1910, Indian Mus., Rec. **5**: 141.—Brunetti, 1911, Indian Mus., Rec. **4**: 310.—Freeman, 1951, Roy. Ent. Soc. London, Proc. B, **20**: 143.—Satchell, 1954, Roy. Ent. Soc. London, Trans. **105**: 480.

Parabrunettia Brunetti, 1911, Indian Mus., Rec. **4**: 311 (type species: *Psychoda squamipennis* Brunetti, by subsequent selection, Brunetti, 1912, Fauna of India, Dipt. Nematocera, 251).

Type of genus: *Diplonema superestes* Annandale (monobasic).

Adult characters: Antenna with 15 or 16 segments; flagellar segments variable, either fusiform without cupuliform verticils of hair or nodiform with verticils, node often eccentric; apical segment with apiculis, not reduced in size; sensory filaments simple, rod-like or greatly elongate, and curved or twisted. Wing broad, very broad in male; covered with hairs and scales arising from membrane as well as veins; Rs pectinate. Surstyle of male genitalia with racquet-shaped and clavate tenacula.

There are species of *Brunettia* which form an intergrading series with *Telmatoscopus* and *Pericoma* and make the separation of these genera difficult in some areas. However, the species of *Brunettia* in Micronesia are readily recognized by the very broad wings, especially in the male, which are densely covered with hairs and scales, in addition to the features mentioned in the key.

3. **Brunettia biformis** Edwards.

Brunettia biformis Edwards, 1928, Insects of Samoa **6**(2): 68.—Satchell, 1950, Roy. Ent. Soc. London, Proc. B, **19**: 184; 1953, *ibid.*, **22**: 185.

Male: Vestiture dense, bushy, black. Thorax with thick covering of short, black scales on mesothoracic anepisternal sense organ; wing vestiture black with nine white spots at apices of veins.

Eyes contiguous, bridge with three rows of facets; anterior two-thirds of frons evenly covered with spatulate hairs; ratio of palpal segments 1:4:5:6. Antenna with 15 segments; subapical segment without internode, apical segment with slender apiculis; sensory filament a single, sinuous rod.

Thorax with large, protuberant sense organ on mesothoracic anepisternum, lobe covered with pits and minute black setae (after scales have been removed), base of lobe

with setae only, base of organ with hairs only. Wing very broad, densely covered with hairs and scales arising from veins and membrane, scales only on basal four-fifths of upper surface, evenly distributed over lower; alula tuft very long, one-third as long as wing width; all veins straight and radiating straight to margin; radial fork basad of medial fork; apex rounded; R_5 ending at apex.

Female (after Satchell, 1953, *op. cit.*): Eyes separated by distance equal to five facets; antenna with internodes shorter than in male. Anepisternite not as protuberant as male, without scales; wing not broadened, 1.7 times as long as wide; with tufts at vein tips more conspicuous than in male; scales replaced by hairs on dorsal surface of wing; lower surface uniformly scaly.

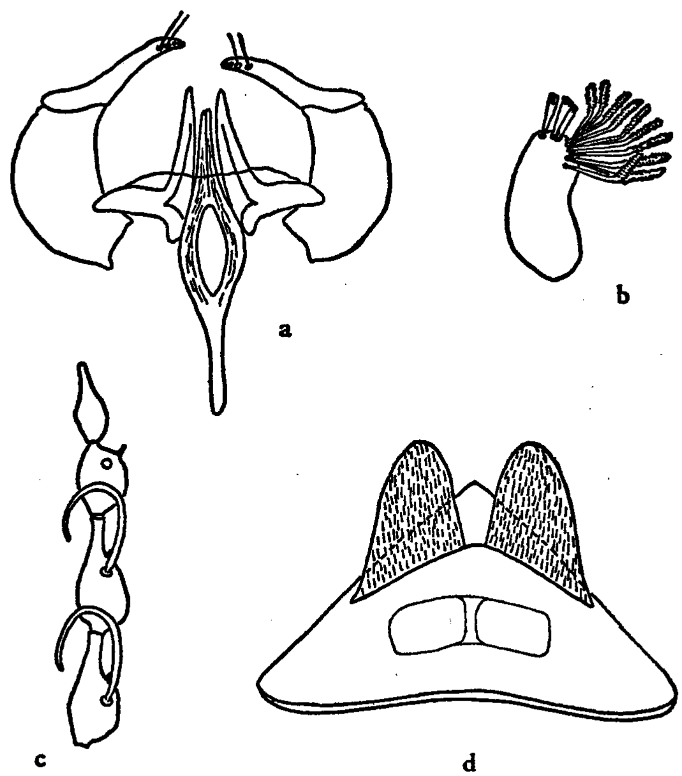


FIGURE 5.—*Brunettia biformis:* **a,** male genitalia, dorsal view; **b,** male surstyle; **c,** antenna tip, male; **d,** female genitalia.

DISTRIBUTION: Samoa, Fiji, Marshall Is., Caroline Is., Palau Is., Mariana Is.

Two discrepancies exist between previous descriptions and the above one. Satchell (1953, *op. cit.*) states that the ratio of the palpal segments is 1:1.3:0.7:0.7. Palpal segment 1 is much shorter than 2 and probably there was a typographical error in Satchell's description. Edwards (1928, *op. cit.*) states

that the eyes of the males are separated by three facets, but Satchell and I note the eyes of the males to be contiguous. Edwards may erroneously have taken that part of his description from a female, which does have the eyes well separated.

As additional specimens become available, *Brunettia biformis* appears as a complex of closely related species or as a single polymorphic species. Some species which apparently belong to this complex have been erected recently [*spinistoma* Tokunaga, 1955, Philippine Jour. Sci. **83**: 413 (Japan); *triangulata* Satchell and *pendleburyi* Satchell (Malaya), and *brevifurca* Satchell

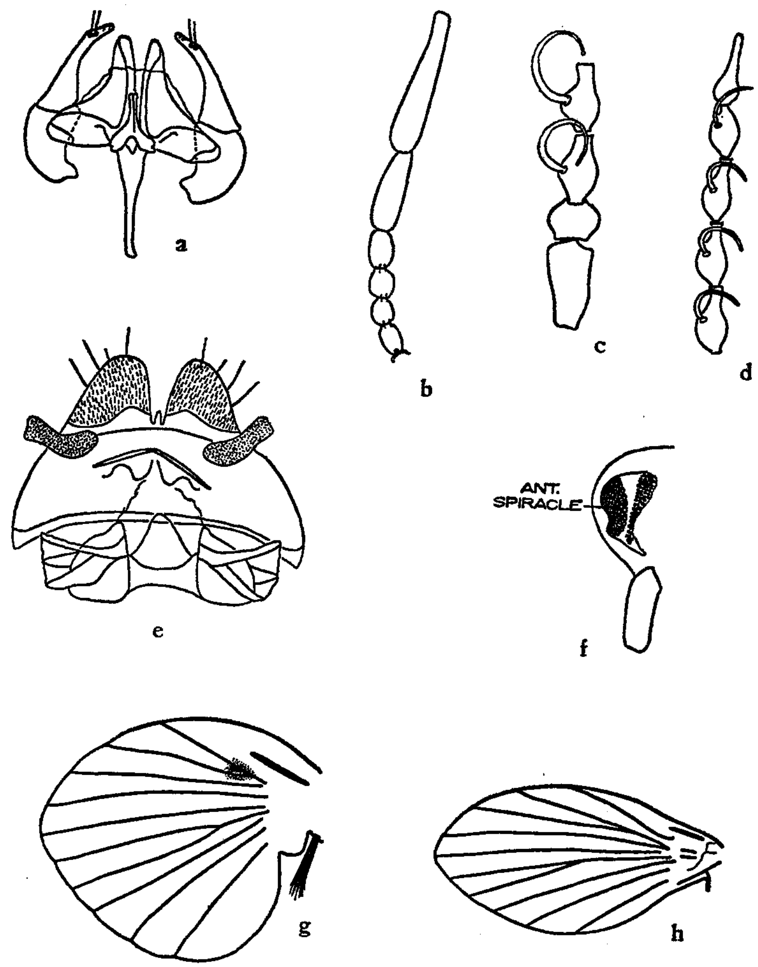


FIGURE 6.—*Brunettia biformis*, Marshalls form: **a**, male genitalia, dorsal view; **b**, fore tibia and tarsus, male; **c**, antenna base, male; **d**, antenna tip, male; **e**, female genitalia; **f**, anterior part of thorax, male; **g**, wing, male; **h**, wing, female.

(North Borneo), 1958, Indian Mus., Rec. **53**: 21-25]. At least five allopatric forms are found in Micronesia. Until a clearer insight on the status of the forms can be ascertained with more material, it seems sensible to withhold giving additional formal names to the taxa and simply designate them by geographical area.

The male genitalia show the greatest differences between the taxa, but the male wing and legs are also subject to variation. The characters are described below under the appropriate geographical segregate.

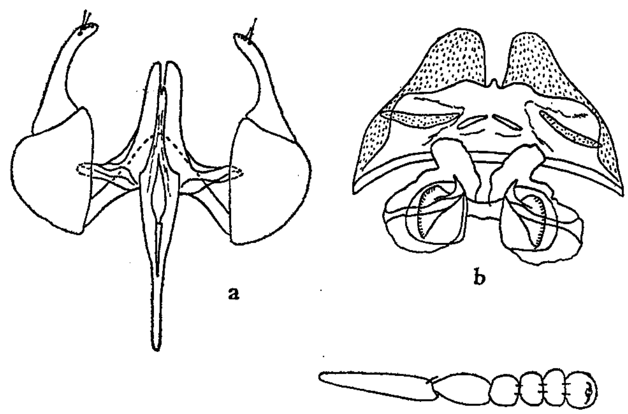


FIGURE 7.—*Brunettia biformis,* Eastern Carolines form: **a,** male genitalia, dorsal view; **b,** female genitalia; **c,** fore tibia and tarsus, male.

Brunettia biformis, nominate form (fig. 5).

Male: Legs with front tibia and tarsus moderately incrassate; wing evenly expanded, posterior expansion on same level as anterior expansion. Male genitalia as illustrated; paramere of moderate size, extending little beyond tip of aedeagus.

Measurements: Wing length 2.7 mm.; wing width 2.1 mm.

DISTRIBUTION: Samoa, Fiji.

Brunettia biformis, Marshalls form (fig. 6).

Male: Legs with front tibia and tarsus normal, not incrassate, wing evenly expanded. Male genitalia as illustrated; parameres much larger than apical part of aedeagus and extending beyond apex of aedeagus (parameres may be widely divergent and lying under dististyli instead of extending directly posteriorly as illustrated).

Measurements: Holotype, wing length 2.7 mm.; wing width 2.2 mm. Paratypes, antenna 1.6 mm.; wing length 2.4-2.6 mm.; wing width 1.9-2.0 mm.

Female: Genitalia as illustrated. (Differences between subgenital plates of *biformis* and *megaloba* may not be as great as shown.)

Measurements: Allotype, antenna 0.9 mm.; wing length 1.9 mm.; wing width 0.9 mm.

DISTRIBUTION: Eastern Caroline Is., Marshall Is.

KUSAIE. Two males, Mt. Fuinkol (Fenkol), 600 m., light trap, Jan. 24, 1953, Gressitt.

MARSHALL IS. JALUIT: Male, female, Imrodj, Aug. 23, 1946, Townes; male, Madyado, Aug. 24, 1946, Townes.

Brunettia biformis, Eastern Carolines form (fig. 7).

Male: Frons and clypeus with patch of white hairs. Legs with front tibia moderately incrassate, front tarsus greatly enlarged; wing evenly expanded, not as broad as *B. biformis*. Male genitalia as illustrated, parameres larger than apical part of aedeagus and extending beyond apex of aedeagus (parameres may be divergent instead of as illustrated).

Measurements: Antenna 1.2-1.3 mm.; wing length 2.3-2.6 mm.; wing width 1.6-1.7 mm.

Female: Wing and genitalia as illustrated.

Measurements: Antenna 0.9 mm.; wing length 1.8 mm.; wing width 0.8 mm.

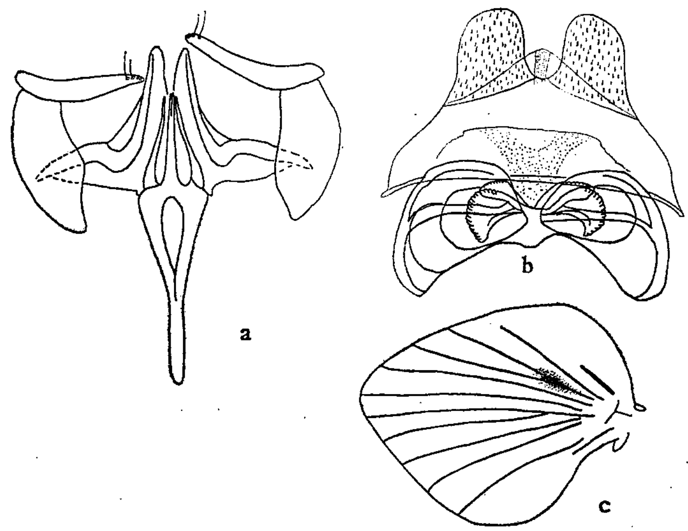


FIGURE 8.—*Brunettia biformis,* Western Carolines form: **a,** male genitalia, dorsal view; **b,** female genitalia; **c,** wing, male.

DISTRIBUTION: Eastern Caroline Is.

PONAPE. Two males, female, Wene (One)-Nihpit (Nipit), July 19, 1939, Esaki; male, Palikir-Colonia, Jan. 16, 1938, Esaki; male, Nanipil, sweeping forest trail, Feb. 25, 1948, Dybas; male, Mt. Dolen Nankep (Dolennankap), 300 m., Aug. 11, 1946, Townes.

Brunettia biformis, Western Carolines form (fig. 8).

Male: Legs with front tibia and tarsus normal, not incrassate; wing unevenly expanded, posterior expansion on line distad of anterior expansion. Male genitalia as illustrated; paramere of moderate size.

Measurements: Antenna 1.3-1.4 mm.; wing length 2.2-2.8 mm.; wing width 1.7-1.9 mm.

Female: Genitalia as illustrated.

Measurements: Antenna 0.9-1.0 mm.; wing length 1.9-2.0 mm.; wing width 0.9-1.0 mm.

DISTRIBUTION: Western Caroline Is.

PALAU. BABELTHUAP: Three males, female, Melekeiok, May 24, 1957, Sabrosky; two males, two females, Imeliik, Netkeng, jungle, June 5, 1957, Sabrosky; female, Airai, Ngerimal River, May 26, 1957, Sabrosky. ULEBSEHEL (Auluptagel): Male, Sept. 1952, Krauss.

YAP. MAP: Male, Oct. 22, 1952, Krauss. YAP: Male, near Yaptown, July 14, 1946, Townes.

Brunettia biformis, Guam form.

Male: Similar to nominate form, but smaller in size and wing narrower.
Measurements: Wing length 1.3 mm.; wing width 0.9 mm.

DISTRIBUTION: S. Mariana Is.

S. MARIANA IS. GUAM: Male, Pt. Oca, June 9, 1945, Bohart and Gressitt.

Brunettia biformis, Bonins form.

Male: Similar to Eastern Carolines form, but wing evenly expanded on anterior margin.
Measurements: Wing length 1.9 mm.; wing width 1.1 mm.

DISTRIBUTION: Bonin Is.

BONIN IS. CHICHI JIMA: Male, Sakaiura, "Bull Beach," May 12-31, 1958, Snyder and Mitchell. HAHA JIMA: Two males, female, Okimura, Apr. 26 to June 9, 1958, Snyder.

Genus **Telmatoscopus** Eaton

Telmatoscopus Eaton, 1904, Ent. Month. Mag., ser. 2, **15**: 58.—Tonnoir, 1933, Indian Mus., Rec. **35**: 70.—Satchell, 1953, Australian Jour. Zool. **1**: 393.—Quate, 1954, Hawaiian Ent. Soc., Proc. **15**: 338; 1955, Univ. Calif. Pub. Ent. **10**: 157.

Type of genus: *Pericoma morula* Eaton (by subsequent selection, Tonnoir, 1933, *op. cit.*).

Adult characters: Antenna with 15 or 16 segments; flagellar segments nodose with cupuliform verticils of hair; apical segment with apiculis, usually not reduced in size; sensory filaments variable, varying from pair of single rods to numerous rods encircling node. Wing moderately broad to rather slender; R_5 usually ending beyond apex; hairs arising only from veins; usually without iridescent scales. Surstyle of male genitalia with one or several tenacula.

KEY TO MICRONESIAN SPECIES OF TELMATOSCOPUS

1. Wing not densely covered with scales over entire surface; terminal antennal segments not noticeably reduced in size 2
   Wing densely covered with iridescent scales over entire surface; terminal three antennal segments reduced in size, about half as large as preceding segments .... **9. T. (Minioceros) squamalatus**

2(1). Wing broad, about twice as long as broad, without infuscate markings; R_5 ending in wing apex 3
Wing moderately narrow, about 2.5 times as long as broad, with infuscate markings at apices of veins and usually at forks; R_5 ending beyond wing apex 4

3(2). Radial fork distad of medial, basad of center of wing; aedeagus of male racquet-shaped .... **7. albipunctatus**
Radial and medial forks on same level, near center of wing; aedeagus of male rod-like, enclosed in grooved paramere .... **8. albipunctoides**

4(2). Base of R_{2+3} near center of basal cell, basad of base of R_5; R_5 ending well beyond wing apex 5
Base of R_{2+3} at apex of basal cell, on same level as base of R_5; R_5 ending little beyond wing apex .... **6. daedalus**

5(4). Radial fork and medial fork nearly on same level .... **4. maculalus**
Radial fork distad of medial fork by distance equal to twice width of cell R_3 at point of bifurcation .... **5. maculoides**

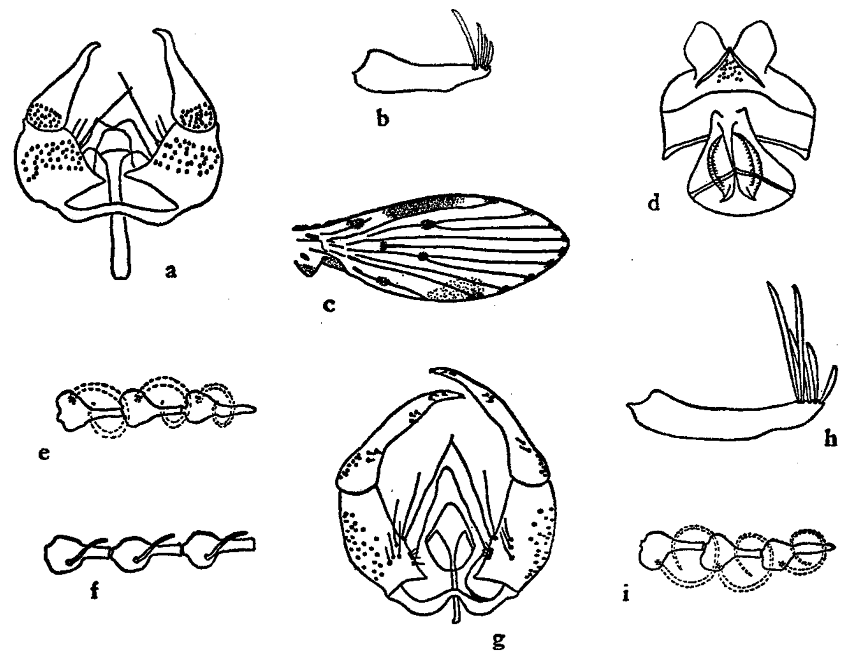


FIGURE 9.—a-f, *Telmatoscopus maculalus: a,* male genitalia, dorsal view; *b,* male surstyle; *c,* wing, male; *d,* female genitalia; *e,* antenna tip, male; *f,* antenna, female. g-i, *T. maculoides: g,* male genitalia, dorsal view; *h,* male surstyle; *i,* antenna tip, male.

4. Telmatoscopus maculalus Quate, n. sp. (fig. 9, *a-f*).

Male: Vestiture white with brown markings; wing with ten brown spots on fringe at apex of each longitudinal vein; tibiae with scattered brown tomentum; apical white rings on tibia and tarsal segments; dorsum of abdomen with few brown hairs among white, venter chiefly brown.

Eyes narrowly separated by distance equal to less than one-half facet; eye bridge with four rows of facets; interocular suture present; frons covered with hair with single row extending posteriorly between eyes to suture; palpus nearly half as long as antenna, ratio of segments 6 : 11 : 10 : 12. Antenna with 16 segments; apical nodes eccentric, apical internodes long and slender; terminal segment with long apiculis; sensory filament consisting of single, curved branch.

Wing with infuscate markings as illustrated; radial fork slightly distad of medial fork; Sc long, ending beyond level of base of R_{2+3}; basal cell long, base of R_5 beyond base of R_{2+3}; R_5 ending beyond apex; apex rounded. Genitalia as illustrated; surstyle swollen one-fourth distance from apex, with four tenacula.

Measurements: Holotype, antenna 1.5 mm.; wing length 2.05 mm.; wing width 0.8 mm. Paratype, wing length 1.8 mm.; wing width 0.7 mm.

Female: Similar to male. Eyes separated by distance equal to two facets. Genitalia as illustrated; subgenital plate strongly bilobed.

Measurements: Allotype, wing length 1.6 mm.; wing width 0.6 mm.

Holotype, male (US 63985), Mt. Unibot, Ton (Tol) I., Truk, native forest, 390 m., light trap, Jan. 3, 1953, Gressitt. Allotype, female (US), Mt. Dolen Nankep (Dolennankap), Ponape, 600 m., Aug. 13, 1946, Townes. Paratypes (BISHOP): Male, same data as for holotype; two females, same data as for allotype.

Other specimens: Male, female, "Nampir" (Nanipil)-Sankakuyama, Ponape, Jan. 3, 1938, Esaki; male, Tomil Dist., Yap, July-Aug. 1950, Goss.

DISTRIBUTION: Caroline Is. (Truk, Yap, Ponape).

5. **Telmatoscopus maculoides** Quate, n. sp. (fig. 9, *g-i*).

Male: Pinned specimens unavailable. (Vestiture probably similar to *maculalus*.) Eyes narrowly separated by distance equal to one-half facet; eye bridge with four rows of facets; interocular suture present; frons covered with hair with irregular double row extending posteriorly between eyes to suture; palpus little less than half as long as antenna, ratio of segments 5 : 9 : 9 : 12. Antenna with 16 segments; apical nodes eccentric, apical internodes long and slender; terminal segment with long apiculis; sensory filament consisting of single, curved branch.

Wing with infuscate markings (same as *maculalus*); radial fork distad of medial fork by distance equal to twice width of cell R_3 at point of bifurcation; Sc long, ending well beyond base of R_{2+3}; basal cell long, base of R_5 beyond base of R_{2+3}; R_5 ending beyond wing apex; apex rounded.

Genitalia as illustrated; surstyle swollen one-fourth distance from apex, with six tenacula.

Measurements: Holotype, antenna 1.5 mm.; wing length 1.9 mm.; wing width 0.75 mm. Paratypes, wing length 1.7-1.9 mm.; wing width 0.7-0.8 mm.

Female: Unknown.

Holotype, male (US 63986), Mt. Temwetemwensekir (Tamatamansakir), Ponape, 180 m., light trap, Jan. 19, 1953, Gressitt. Paratypes (BISHOP): Four males, same data as for holotype; two males, same locality, 160 m., Jan. 15, 1953, Gressitt.

Other specimens: Male, Yap Hill, Yap I., Yap, 50 m., light trap, Dec. 1, 1952, Gressitt.

DISTRIBUTION: Caroline Is. (Yap, Ponape).

This species and *Telmatoscopus maculalus* are very closely related and undoubtedly are of relatively recent separation. They are indistinguishable in the head, antenna, and most wing characters. The shape of the aedeagus and diststyle of the male genitalia and the position of the radial and medial forks are the only characters which readily separate the two species. The wing markings and venation, especially the long basal cell, the position of the origin of R_{2+3}, and the long Sc, quickly separate the two from other known Micronesian psychodids.

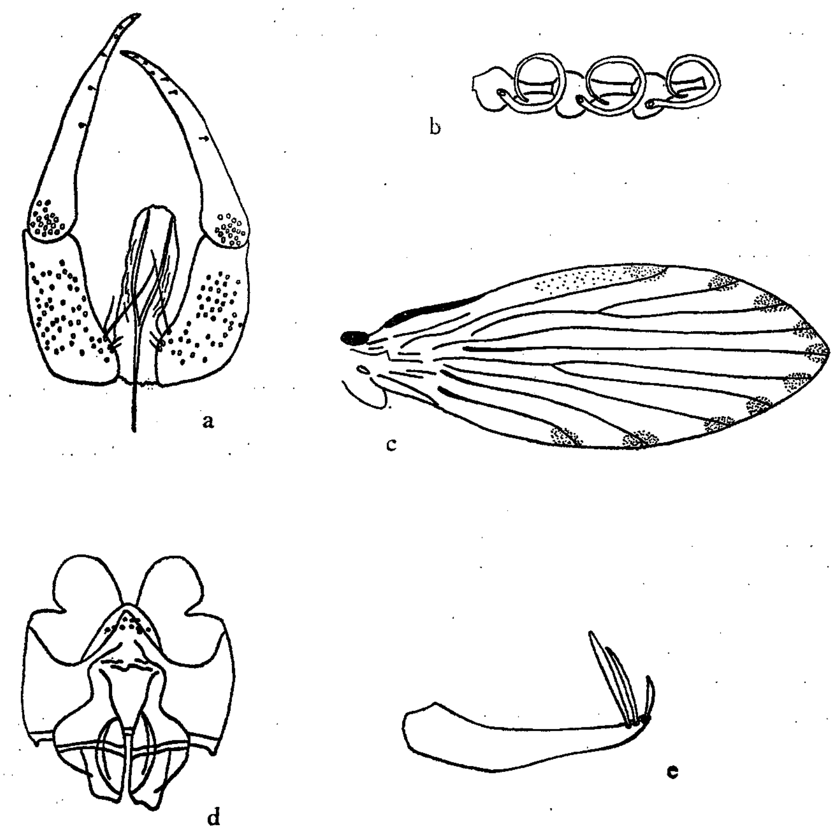


FIGURE 10.—*Telmatoscopus daedalus:* **a,** male genitalia, dorsal view; **b,** antenna, male; **c,** wing, male; **d,** female genitalia; **e,** male surstyle.

6. **Telmatoscopus daedalus** Quate, n. sp. (fig. 10).

Male: Pinned specimens unavailable. Eyes separated by distance equal to nearly three facets; bridge with four rows of facets; interocular suture present; frons covered with hair on disc with irregular triple row of hairs extending posteriorly to suture; ratio of palpal segments 4:8:8:12. Antenna with 16 segments; apical nodes eccentric, apical

internodes long and slender; terminal segment with long apiculis; sensory filament consisting of single, curved branch.

Wing with infuscate markings as illustrated; radial fork distad of medial fork by distance equal to 3 times width of cell R_3 at point of bifurcation; Sc long, ending beyond base of R_{2+3}; basal cell long, base of R_5 at same level as base of R_{2+3}, R_5 ending little beyond wing apex; apex rounded.

Genitalia as illustrated; surstyle slender, without apical swelling, with three tenacula (four in paratype).

Measurements: Holotype, antenna broken; wing length 1.55 mm.; wing width 0.6 mm. Paratypes, antenna 1.2 mm.; wing length 1.5 mm.; wing width 0.6 mm.

Female: Similar to male. Eyes separated by distance equal to nearly four facets. Subgenital plate rectangular with pair of well-developed lobes.

Measurements: Allotype, antenna 0.9 mm.; wing length 1.6 mm.; wing width 0.65 mm.

Holotype, male (US 63987), Ulimang, Babelthuap, Palau, Dec. 24, 1947, Dybas; allotype, female (US), same data. Paratypes (CM), all Palau: Male, Ngiwal, Babelthuap, light trap, May 20, 1957, Sabrosky; male, Koror, light trap, Sept. 16, 1952, Beardsley; male, Koror, 25 m., Dec. 5, 1952, Gressitt.

DISTRIBUTION: Caroline Is. (Palau).

This species is related to the two preceding species, *maculalus* and *maculoides,* on the basis of the head and antennal structure, the wing markings, and the facies of the genitalia. However, *daedalus* is more widely separated from *maculalus* and *maculoides* than the latter two are from each other. The divergence is expressed in the wing venation in which *daedalus* differs in the origin of R_{2+3} being farther distad, the radial and medial forks being more separated, R_5 ending nearer the apex of the wing, and the distinctive genitalia.

7. **Telmatoscopus albipunctatus** (Williston). (Figure 11.)

Psychoda albipunctata Williston, 1893, Ent. News **4**: 113.

Telmatoscopus albipunctatus, Tonnoir, 1921, Mus. Nat. Hist. Natur. Paris, Bull. **27**: 297.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 63.—Quate, 1954, Hawaiian Ent. Soc., Proc. **15**: 340; 1955, Univ. Calif. Pub. Ent. **10**: 185.

Male: Large, well-marked species; vestiture brown and white; antennal verticils large, white; head vestiture brown with some white on vertex; scutum with brown-tipped white hairs; wing vestiture brown with white spots at apices of veins, adjacent black and white tufts at radial and medial forks, faint band of white spots near center; legs, except femora, densely covered with brown tomentum and sometimes few, scattered white tomentose hairs; apex of femur, tibia, and tarsal segment 1 and base of tibia with white tomentose annuli; tarsal segments 1 to 3 with dense, brown fringe on posterior border, fringe longest on segment 1; abdomen covered with mixture of brown and white hairs.

Eyes separated by distance equal to one facet; eye bridge with four rows of facets; interocular suture present; frontal suture extending from inner eye margin to antenna base with medial spur near eye margin; palpus long, one-half as long as antenna, ratio of segments 2:8:5:6. Antenna two-thirds as long as wing; scape compact clavate, 1.5 times as long as pedicel; flagellar segment 1 with node and internode equal in length, following nodes progressively decreasing in size, internodes increasing in length; terminal segment with long apiculis; sensory filaments composed of two anterior branches extending forward to apex of internode.

Wing broad, radial fork distad of medial fork by distance equal to width of cell R_3 at point of bifurcation; Sc ending at level of base of R_{2+3}; apex acute, R_5 ending in apex.

Genitalia as illustrated; aedeagus racquet-shaped, dististyle slender.

Measurements: Antenna 2.0-2.6 mm.; wing length 2.6-3.8 mm.; wing width 1.0-2.6 mm.

Female: Similar to male. Antennal verticils not as well developed; sensory filament composed of single anterior branch; genitalia as illustrated, subgenital plate with moderately weak apical concavity, not strongly bilobed.

Measurements: Antenna 2.3-2.6 mm.; wing length 2.8-4.1 mm.; wing width 1.3-2.0 mm.

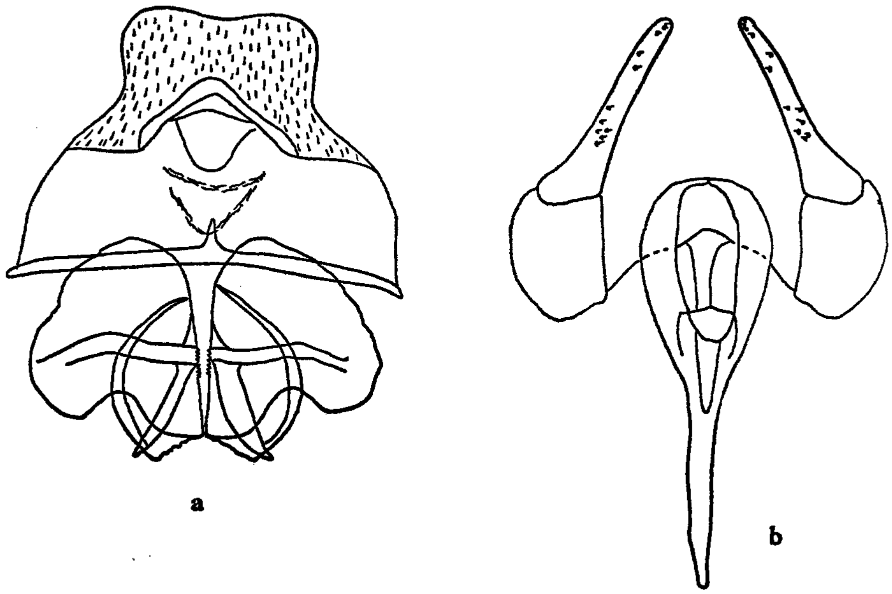


FIGURE 11.—*Telmatoscopus albipunctatus:* **a,** female genitalia; **b,** male genitalia, dorsal view.

DISTRIBUTION: Tropicopolitan, Mariana Is., Caroline Is.

S. MARIANA IS. SAIPAN: One, Chalan Kanoa (Charan Ronoa), July 21, 1944, Hall.

PALAU. BABELTHUAP: Two, Imeliik (Eimeliik)-Ngaremeskang, Aug. 18, 1939, Esaki. KOROR: One, Jan. 29, 1938, Esaki; five, Apr. 15-22, 1957, Sabrosky; one, Oct. 8, 1952, Beardsley; one, Sept. 1952, Krauss.

KUSAIE. One, Weye Cave, light trap, Mar. 10, 1955, Clarke.

The distinctive coloration of pinned specimens, the broad wings with forks near the same level before the center, and the simple, racquet-shaped aedeagus of the male make this species readily separable from all other Micronesian psychodids except *albipunctoides*. Characters for their separation are discussed below.

8. Telmatoscopus albipunctoides Quate, n. sp. (fig. 12).

Male: Pinned specimens unavailable. Species very similar to *albipunctatus*.

Eyes separated by distance equal to one facet; eye bridge with four rows of facets; interocular suture present; frontal suture extending from antennal base halfway to inner eye margin; palpus long, more than half as long as antenna, ratio of segments 2:10:7:9. Antenna with 16 segments; flagellar segment 1 with node and internode same length, following nodes progressively decreasing in size, internodes increasing in length; terminal segment with long apiculis; sensory filament consisting of about 12 anterior branches arising from common base.

Wing broad; spatulate hairs on basal half; radial and medial forks on same level, near center of wing; Sc ending beyond level of base of R_{2+3}; apex acute, R_5 ending in apex.

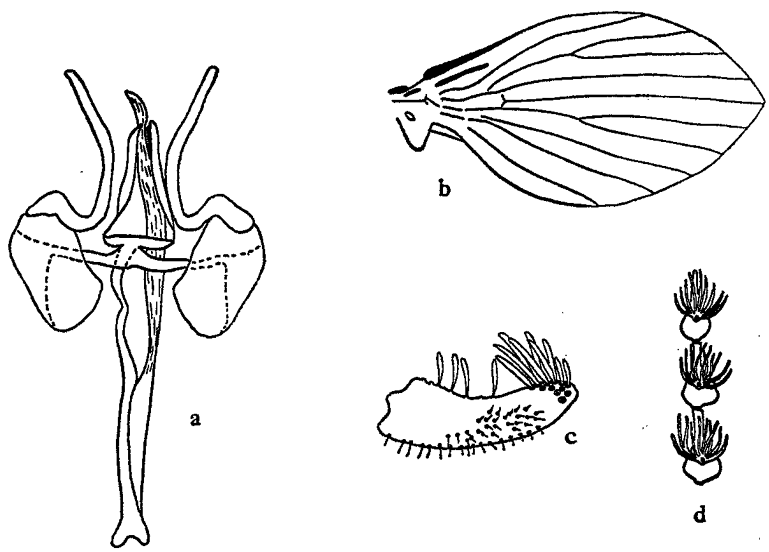


FIGURE 12.—*Telmatoscopus albipunctoides:* **a**, male genitalia, dorsal view; **b**, wing, male; **c**, male surstyle; **d**, antenna tip, male.

Genitalia as illustrated; aedeagus partly enclosed in grooved paramere; dististyle long, slender, strongly arched at base; surstyle short and thick, bearing numerous tenacula.

Measurements: Holotype, antenna 1.7 mm.; wing length 2.6 mm.; wing width 1.3 mm. Paratypes, wing length 2.2-2.5 mm.; wing width 1.1-1.3 mm.

Female: Unknown.

Holotype, male (US 63988), Koror, Palau, at light, Sept. 16, 1952, Beardsley. Paratypes (BISHOP): Two males, same data as for holotype; male, same locality, Dec. 19, 1952, Gressitt; male, same locality, Mar. 26, 1938, Murakami.

DISTRIBUTION: Caroline Is. (Palau).

This species is a close relative of *albipunctatus* and the two species might easily be confused. The characters separating the two are the sensory filaments (U-shaped in *albipunctatus* and multibranched in *albipunctoides*), the position

of the radial and medial wing forks (near center of wing in *albipunctoides* and before center in *albipunctatus*), and the structure of the male genitalia. The wing shape, head, antenna, and size of the two species are indistinguishable.

Subgenus **Minioceros** Quate, new subgenus

Type of subgenus: *Telmatoscopus* (*Minioceros*) *squamalatus,* n. sp. by present designation.

Adult characters: Antenna with 16 segments, terminal three segments reduced in size, about half size of preceding, sensory filament Y-shaped; palpus with segment 1 about half length of 2. Wings of both sexes densely covered over entire surface with iridescent scales; radial fork distad of medial; R_4 branching from R_{2+3} near base; R_5 ending in wing apex. Abdomen covered with iridescent scales.

Minioceros (Greek, *minys* is small; *keras* is a horn) refers to the diminutive terminal segments of the antenna; the gender is masculine.

At first sight the subgenus *Minioceros* appears to belong to the genus *Brunettia* because of the conspicuous iridescent scales on the wings and body, which are characteristic of most species of *Brunettia.* However, closer examination reveals some major differences between the two. *Minioceros* differs from *Brunettia* and resembles *Telmatoscopus* in the wing venation and the structure of male and female genitalia, notably the spatulate tenacula of the male surstyle.

Minioceros appears to be most closely related to the subgenus *Mormia* as defined by Jung (1956, Deutsche Ent. Zeitschr., n. ser., 3: 197) in the reduced size of the terminal antennal segments and wing venation (R_{2+3} and R_4 branching close to wing base, R_5 ending in wing apex, radial fork distad of medial). *Minioceros* differs from that subgenus and others in *Telmatoscopus* in having the terminal three segments (instead of two) reduced, the sensory filaments Y-shaped (instead of V-shaped or single-branched), and the dense covering of scales on the wings and abdomen.

9. **Telmatoscopus (Minioceros) squamalatus** Quate, n. sp. (fig. 13).

Male: Vestiture black, scales on wing and abdomen iridescent; patch of hairs on frons and clypeus cream colored; apical fringe of wing white; apical rings of tibia and tarsus cream colored.

Eyes separated by distance equal to four facets; bridge with three irregular rows of facets; interocular suture present; frons covered with hair on disc, less dense posteriorly. Ratio of palpal segments 9:17:22:20. Antenna with 16 segments, segments 3 to 13 nodiform, terminal three reduced in size, segments 14 and 15 partly fused; sensory filament Y-shaped, anterior branches broader than posterior.

Thorax without sensory organ. Wing moderately narrow; scales arising from membrane as well as from veins; radial fork well distad of medial; Rs pectinate; R_{2+3} and R_4 branching near base of wing; basal cell very short; R_5 ending in apex; Cu ending little beyond level of medial fork.

Genitalia as illustrated; dististyle strongly curved near apex; surstyle elongate, slender, bearing two tenacula.

Measurements: Holotype, antenna 1.3 mm.; wing length 1.8 mm.; wing width 0.7 mm. Paratypes, antenna 1.2-1.4 mm.; wing length 1.8-2.2 mm.; wing width 0.6-0.8 mm.

Female: Similar to male; body and wings also covered with scales. Eyes separated by distance equal to five facets. Genitalia as illustrated; subgenital plate with deep apical concavity.

Measurements: Allotype, antenna 1.1 mm.; wing length 2.3 mm.; wing width 0.8 mm. Paratypes, antenna 0.9 mm.; wing length 1.7-1.9 mm.; wing width 0.6-0.7 mm.

Holotype, male (US 63989), Mt. Temwetemwensekir, Ponape, 180 m., light trap, Jan. 18, 1953, Gressitt; allotype, female (US), Nanpohnmal, south of Colonia, Ponape, light trap, native forest, Oct. 1, 1953, Gressitt. Paratypes (BISHOP): Eight males, female, same locality as for holotype, Jan. 15, 16, 18, 1953, Gressitt; two females, same data as for allotype; female, same locality as for allotype, 70 m., Jan. 9, 1953, Gressitt; male, Mt. Dolen Nankep, Ponape, 510-570 m., Aug. 13, 1946, Townes.

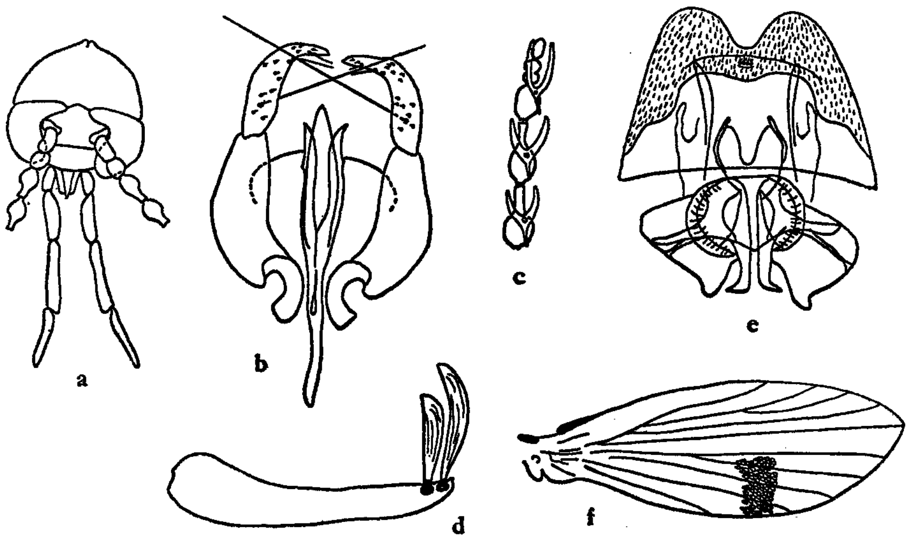


FIGURE 13.—*Telmatoscopus (Minioceros) squamalatus:* **a**, head, male; **b**, male genitalia, dorsal view; **c**, antenna tip, male; **d**, male surstyle; **e**, female genitalia; **f**, wing, male.

Other specimens, all Palau, Babelthuap: Female, Ngiwal, jungle, May 21, 1957, Sabrosky; female, same locality, July 21, 1946, Townes; female, Ngaremlengui, June 4, 1957, Sabrosky; three males, two females, Ngatpang, Dec. 8, 1953, Gressitt; male, female, East Ngatpang, 65 m., Dec. 10, 1952, Gressitt; two males, five females, Imeliik, Netkeng, jungle, June 5, 1957, Sabrosky; female, Ngatkip (Gakip), July 19, 1946, Townes; two males, female, Airai, Ngerimal River, May 26, 1957, Sabrosky.

Other specimen, Guam: Male, Mt. Lamlam, Oct. 1957, Krauss.

DISTRIBUTION: Caroline Is. (Ponape, Palau), S. Mariana Is. (Guam).

Genus Trichopsychoda Tonnoir

Trichopsychoda Tonnoir, 1922, Soc. Ent. Belgique, Ann. **62**: 59 (subgenus of *Psychoda*).—Satchell, 1955, Roy. Ent. Soc. London, Proc. B, **24**: 50.

Type of genus: *Trichopsychoda hirtella* Tonnoir (by original designation).

Adult characters (after Satchell, 1955, *op. cit.*): Antenna with 15 or 16 segments, flagellar segments nodiform, segment 13 without internode; terminal segments beyond 13 reduced in size, enclosed within verticil of segment 13; sensory filaments Y-shaped, in pairs on segments 3 to 13. Labellum bulbous, without teeth.

Wing with fine vestiture of hairs on membrane as well as veins; R_5 ending exactly at wing apex; radial and medial forks often incomplete, radial fork distad of medial beyond middle of wing.

Male genitalia with bell-like, fringed or spatulate tenacula on surstyle.

Most members of *Trichopsychoda* may be recognized by the hairs on the membrane as well as the veins of the wings, the absence of the bases of R_3 and M_3, the bell-shaped tenacula on the short surstyle of the male genitalia and the female subgenital plate with its deep apical concavity, but without well-marked lobes. Satchell (1955, *op cit.*) reviewed the genus and expanded it considerably so that the above features do not embrace all the species as the genus is presently defined. The only character which will consistently separate members of *Trichopsychoda* from the other Psychodinae is the presence of hairs on the membrane. However, the above-mentioned characters of venation and genitalia are still useful for the proper placement of most species.

Key to Micronesian Species of Trichopsychoda

1. Surstyle of male genitalia with a sharp, apical spur; female subgenital plate without constriction at base of apical lobes (Caroline Is.)..............**10. carolinensis**
   Surstyle of male with apical, finger-like lobe; female subgenital plate with marked constriction at base of apical lobes (Bonin Is.)....................**11. boninensis**

10. Trichopsychoda carolinensis Quate, n. sp. (fig. 14).

Male: Vestiture of body light brown, of wings gray. Eyes narrowly separated by distance equal to less than one-half a facet; bridge with four rows of facets; interocular suture present, with median spur projecting posteriorly; frons covered with hair on disc, without band of hairs extending posteriorly. Palpal segments 2 and 3 broader than 1 and 4, ratio of segments 9:10:14:14. Antenna with 16 segments; terminal three clearly separated; sensory filament Y-shaped.

Wing with radial and medial forks incomplete, bases of R_3 and M_3 absent.

Genitalia as illustrated; tergite (ventral) 9 elongate, nearly twice as long as wide; surstyle with apical, ventral spur, bearing number of long tenacula ending in bell-like tips.

Measurements: Holotype, antenna 1.1 mm.; wing length 1.4 mm.; wing width 0.6 mm. Paratypes, antenna 1.0-1.3 mm.; wing length 1.4-1.6 mm.; wing width 0.5-0.6 mm.

Female: Similar to male. Genitalia as illustrated; spermatheca reticulate, subgenital plate with nearly straight, convergent sides and deep apical concavity.

Measurements: Allotype, antenna 0.9 mm.; wing length 1.6 mm.; wing width 0.6 mm. Paratypes, antenna 0.7-0.8 mm.; wing length 1.4-1.5 mm.; wing width 0.5-0.6 mm.

Holotype, male (US 63990), Mt. Unibot, Ton (Tol) I., Truk, 390 m., light trap, Feb. 3, 1953, Gressitt; allotype, female (US), same locality, 32 m., Jan. 3, 1953, Gressitt. Paratypes (BISHOP, BM), all Truk: Eight males, two females, same locality, 32-390 m., Dec. 30, 1952 to Feb. 4, 1953, Gressitt; three males, five females, Ton, Jan. 4, 1953, Gressitt; female, Mt. Chukumong (Teroken), Wena (Moen), 150 m., Dec. 27, 1952, Gressitt.

DISTRIBUTION: Caroline Is. (Truk).

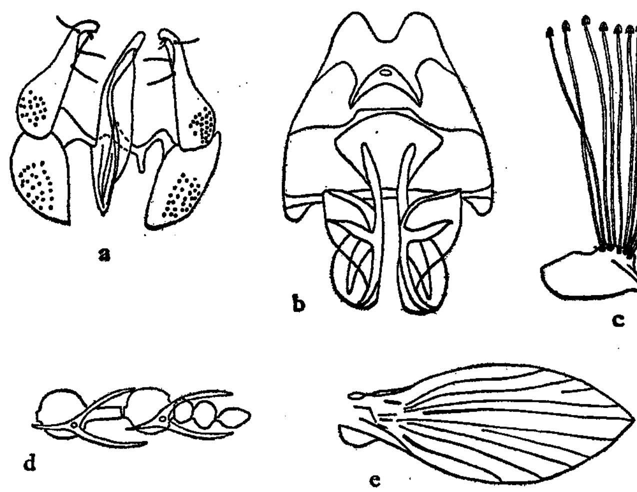


FIGURE 14.—*Trichopsychoda carolinensis:* **a**, male genitalia, dorsal view; **b**, female genitalia; **c**, male surstyle, lateral view; **d**, antenna tip, male; **e**, wing, male.

11. **Trichopsychoda boninensis** Quate, n. sp. (fig. 15).

Male: Pinned specimens not available (vestiture probably uniformly gray). Eyes narrowly separated by distance equal to less than one-half a facet; bridge with four rows of facets; interocular suture present, with median spur projecting posteriorly on mid-line; frons covered with hair on disc with triangular patch extending posteriorly on mid-line to level of second row of facets. Ratio of palpal segments 10:14:18:18. Antenna with 16 segments; terminal three clearly separated; sensory filament Y-shaped.

Wing with radial and medial forks incomplete, bases of R_2 and M_2 absent.

Genitalia as illustrated; tergite 9 about as long as wide; surstyle with large truncate lobe bearing tenacula, tenacula very long, ending in bell-shaped tips, finger-like lobe at apex.

Measurements: Holotype, antenna, 1.3 mm.; wing length 2.0 mm.; wing width 0.8 mm.

Female: Similar to male. Genitalia as illustrated; subgenital plate with constriction at base of lobes, apical concavity deep.

Measurements: Allotype, antenna 1.0 mm.; wing length 2.1 mm.; wing width 0.8 mm. Paratypes, antenna 0.9-1.1 mm.; wing length 1.8-2.1 mm.; wing width 0.7-0.8 mm.

Holotype, male (BISHOP 2850), Bonin Is., Chichi Jima, Futami-ko (Omura, Port Lloyd), May 10, 1956, Clagg; allotype, female (BISHOP),

same data. Paratypes (BISHOP), six males, ten females, same data as for holotype.

Other specimen, male, same locality as types, "Camp Beach," Apr. 2-25, 1958, Snyder.

DISTRIBUTION: Bonin Is.

This species is a typical member of the genus, clearly possessing the characters which make this group most distinctive. It is closely related to *carolinensis,* differing only in the structure of the genitalia of both sexes. It would appear that both species originated from a single colonization in Micronesia.

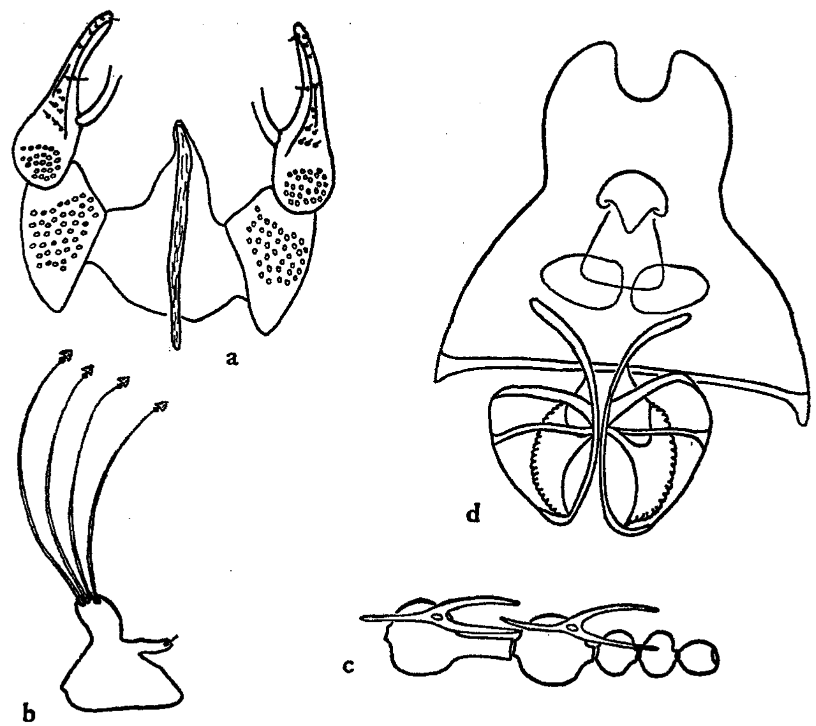


FIGURE 15.—*Trichopsychoda boninensis:* **a,** male genitalia, dorsal view; **b,** male surstyle, lateral view; **c,** antenna tip, male; **d,** female genitalia.

Genus **Psychoda** Latreille

Psychoda Latreille, 1796, Précis. Caract. Gen. Ins., 152 (no included species); 1802, Hist. Nat. Crust. Ins. **3**: 424 (included *Tipula phalaenoides* Linnaeus).—del Rosario, 1936, Philippine Jour. Sci. **59**: 554.—Satchell, 1947, Parasitology **38**: 51 (larvae); 1953, Australian Jour. Zool. **1**: 372; 1954,

Roy. Ent. Soc. London, Trans. **105**: 476.—Quate, 1954, Hawaiian Ent. Soc., Proc. **15**: 341; 1955, Univ. Calif. Pub. Ent. **10**: 191, 252.

Type of genus: *Tipula phalaenoides* Linnaeus (by monotypy).

Adult characters: Small to medium sized; vestiture usually uniformly yellow or gray. Antenna with 14 to 16 segments; flagellar segments nodose with cupuliform verticils of hair; terminal segments beyond segment 13 reduced in size to about one-half of segment 12, without internode or apiculis; sensory filaments Y-shaped, rarely with three anterior branches. Wing moderately broad; R_5 ending in apex; without scales; hairs arising only from veins. Surstyle of male genitalia usually with only one tenaculum.

Key to Micronesian Species of Psychoda

1. Radial and medial forks incomplete, basal parts of R_3 and M_3 definitely absent 2
   Radial and medial forks complete or only weakened at bifurcation 5

2(1). Apex of Cu at, or mesad of, level of base of R_s 3
   Apex of Cu beyond level of base of R_s .... **22. ichthycerca**

3(2). Sides of apical lobes of female subgenital plate strongly divergent or convergent; male genitalia with prominent shelf-like paramere under aedeagus 4
   Sides of apical lobes of female subgenital plate subparallel; male genitalia without paramere .... **18. mediocris**

4(3). Sides of apical lobes of female subgenital plate divergent; base of male dististyle enlarged and slightly bulbous .... **19. parsivena**
   Sides of apical lobes of female subgenital plate convergent; male dististyle gradually and only slightly narrowing from base to apex .... **17. lucubrans**

5(1). Antenna with 16 segments 6
   Antenna with 14 or 15 segments 11

6(5). Labellum with three large spines 7
   Labellum with two large spines 8

7(6). Small species, wing length less than 1.4 mm.; female genitalia with trident-shaped structure above plate .... **15. aponesos**
   Larger species, wing length 1.5 mm. or more; female genitalia with lyre-shaped structure above plate .... **32. longiseta**

8(6). Node of flagellar segment 1 of antenna pyriform, larger and of different shape than segment 2 9
   Node of flagellar segment 1 spherical, similar in size and shape to 2 .... **34. harrisi**

9(8). Groove on mid-line of head of male shallow; apex of female subgenital plate truncate or with projection on mid-line 10
   Groove on head of male very deeply impressed; apex of female subgenital plate concave .... **13. hemicorcula**

10(9). Frons of male with four large, dark sockets on each side of mid-line above clypeus from which arise long hairs; apex of female subgenital plate with projection on mid-line between lateral lobes .... **14. acutilamina**
   Frons of male without large sockets; apex of female subgenital plate truncate .... **12. plaesia**

11(5). Wing with brown spots at tips of veins; terminal antennal segment small, button-like 12
   Wing without brown spots at tips of veins; terminal antennal segment not button-like 13

12(11). Radial fork distad of level of medial fork by distance equal to about twice width of cell R_3 at point of bifurcation; female subgenital plate V-shaped .... **20. alternata**
Radial fork on about same level as medial fork; female subgenital plate not V-shaped, apex deeply cleft, parallel-sided .... **21. acanthostyla**

13(11). Wings without brown markings 14
Wings with four transverse brown bands .... **23. adumbrata**

14(13). Antenna with 14 segments 15
Antenna with 15 segments, 14 may be reduced to swelling between 13 and 15 16

15(14). Dististyle of male genitalia with short, setose projection near center; female subgenital plate with structure resembling horse collar on internal face at base of apical lobes .... **24. yapensis**
Dististyle of male normal, without projection; female subgenital plate without conspicuous structure on internal face .... **16. cochlearia**

16(14). Males 17
Females 20

17(16). Surstyle elongate, of usual *Psychoda* type; tenaculum no more than one-third length of surstyle 18
Surstyle short and stocky; tenaculum about one-half length of surstyle 19

18(17). Lateral shaft of aedeagus short and straight; dististyle and basistyle subequal in length .... **25. rarotongensis**
Lateral shaft of aedeagus long and curved; dististyle longer than basistyle .... **26. quadrifilis**

19(17). Wing membrane bare without vestiture; antennal segments 13 and 14 broadly fused .... **29. ochra**
Wing membrane with vestiture; antennal segments 13 and 14 clearly separated .... **33. allodapa**

20(16). Subgenital plate with hemispherical, rosette-like structure on internal face 21
Subgenital plate without hemispherical, rosette-like structure 22

21(20). Apex of subgenital plate without well-defined lobes .... **25. rarotongensis**
Apex of subgenital plate with pair of well-defined lobes .... **30. gressitti**

22(20). Lobes of subgenital plate attached to base, base larger than lobes 23
Lobes of subgenital plate composing most of plate, without well-differentiated base .... **31. adyscheres**

23(22). Pair of setose lobes at base of apical lobes on internal face of subgenital plate; base without median, posterior projection .... **29. ochra**
No setose lobes on internal face of subgenital plate; base with median, posterior projection .... **26. quadrifilis**

12. Psychoda plaesia Quate, n. sp. (fig. 16, *a-d*).

Male: Eyes separated by distance equal to one-half a facet; eye bridge with four rows of facets; frons with hair only on anterior half; vertex with small median groove. Labellum with four teeth and two spines, one tooth set far apart from other three; ratio of palpal segments 8 : 12 : 14 : 18. Antenna with 16 segments, terminal three clearly separated; sensory filament Y-shaped.

Wing with radial and medial forks complete; ratio of $R_{2+3} : R_2 : R_3 = 6 : 6 : 9$; veins without brown spots at tips.

Genitalia as illustrated; surstyle short and stocky, bearing one long tenaculum.

Measurements: Holotype, antenna 1.5 mm.; wing length 1.7 mm.; wing width 0.7 mm.

Female: Similar to male. Eyes separated by distance equal to two facets; head without median groove on vertex. Genitalia as illustrated; subgenital plate with apical part nearly rectangular, apical margin nearly straight with very shallow concavity; three longitudinal bars lying above plate internally.

Measurements: Allotype, antenna broken; wing length 1.8 mm.; wing width 0.7 mm.

Holotype, male (KU), Omura, Chichi Jima, Bonin Is., April 18, 1934, Okabe and Ikeda; allotype, female, same data. Paratype, male, same data as for holotype.

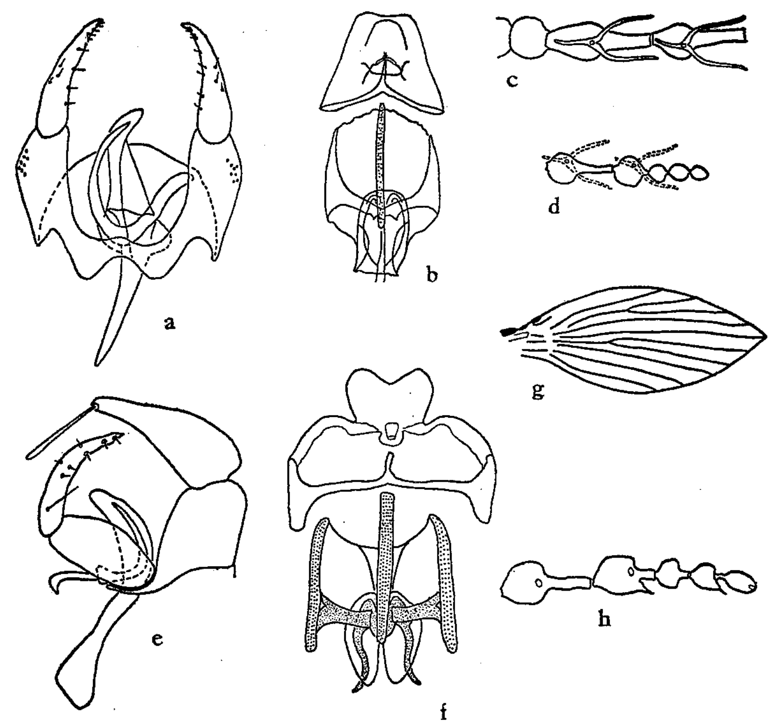


FIGURE 16.—**a-d,** *Psychoda plaesia: a,* male genitalia, dorsal view; *b,* female genitalia; *c,* antenna base, male; *d,* antenna tip, male. **e-h,** *P. hemicorcula: e,* male genitalia, lateral view; *f,* female genitalia; *g,* wing, male; *h,* antenna tip, male.

Other specimens: Female (BISHOP), Yap I., Yap, July-Aug., 1950, Goss; female (BISHOP), Ngaremlengui, Babelthuap, Palau Is., June 1, 1957, Sabrosky.

DISTRIBUTION: Bonin Is., Caroline Is. (Palau, Yap).

This species is related to the complex of *hemicorcula* and *acutilamina,* which are quite large species with 16-segmented antennae, stocky male surstyli, and three bars above the female spermatheca. *P. plaesia* differs from the other two

species, having only a small, indistinct groove on the head of the male and the apex of the female subgenital plate almost truncate.

13. **Psychoda hemicorcula** Quate, n. sp. (fig. 16, *e-h*).

Male: Eyes narrowly separated by distance equal to less than one-half a facet; eye bridge with four rows of facets; frons with hair only on anterior area between antennal bases and two irregular rows of hair extending posteriorly between eyes but not quite joining hair area on vertex, row of very long, spatulate hairs on suture above clypeus, four hairs on each side of mid-line, sockets large, dark; vertex with very long hair which extends downward as far as clypeus, median groove extending from occipital foramen over vertex to lower eye margin, deeply impressed on vertex and becoming more shallow anteriorly. Labellum with four teeth and two spines, one tooth set far apart from other three, not of typical *Psychoda* shape; ratio of palpal segments 7:10:10:13. Antenna with 16 segments, terminal three clearly separated; 14 and 15 with lateral spine on distal margin, 16 with pit in apex (sensory filaments absent in male specimens).

Wing as illustrated; radial and medial forks complete; ratio of $R_{2+3}:R_2:R_3=$ 6:6:9; veins without brown spots at tips.

Genitalia as illustrated; surstyle short and stocky, bearing one long tenaculum.

Measurements: Holotype, antenna 1.3 mm.; wing length 1.7 mm.; wing width 0.7 mm.

Female: Similar to male. Eyes separated by distance equal to a little less than one facet, head without median groove and no long hairs on vertex or frons; sensory filament of antenna with two anterior and one posterior branch, Y-shaped. Genitalia as illustrated; subgenital plate with apical part shaped like half a heart, genital digit triangular; three longitudinal bars lying above plate internally.

Measurements: Allotype, wing length 1.6 mm.; wing width 0.6 mm.

Holotype, male (US 63991), Yap Is., Yap, July-Aug. 1950, Goss; allotype, female (US), same data. Paratypes (US, MCZ, BISHOP), all Yap: Male, same data as for holotype; female, S. Yap, July-Aug. 1950, Goss; female, Gagil Distr., July-Aug. 1950, Goss; two females, Kanif, July-Aug. 1950, Goss.

Other specimens, all Palau: Ngiwal, Babelthuap, May 19, 1957, Sabrosky; Ngerabad, Koror, May 17, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau, Yap).

14. **Psychoda acutilamina** Quate, n. sp. (fig. 17).

Male: Vestiture dark gray; wing narrow. Eyes narrowly separated by distance equal to less than one-half a facet; eye bridge with four rows of facets; frons with hair only on anterior area between antennal bases and two irregular rows of hair extending posteriorly between eyes but not quite joining hair area on vertex; row of very long, spatulate hairs on suture above clypeus, four hairs on each side of mid-line, sockets large and dark; vertex with very long hair extending downward as far as clypeus, median groove extending from occipital foramen over vertex to lower eye margin, deeply impressed on vertex, and becoming more shallow anteriorly. Labellum with four teeth and two spines, one tooth set far apart from other three, not of typical *Psychoda* shape; ratio of palpal segments 8:10:12:16. Antenna with 16 segments, terminal three clearly separated; 14 and 15 with lateral spine on distal margin, 16 with pit in apex; sensory filament Y-shaped.

Wing with radial and medial forks complete; ratio of $R_{2+3}:R_2:R_3=7:6:9$; veins without brown spots at tips.

Genitalia as illustrated; surstyle short and stocky, bearing one long tenaculum.

Measurements: Holotype, antenna 1.4 mm.; wing length 1.8 mm.; wing width 0.7 mm.

Female: Similar to male. Eyes separated by distance equal to nearly two facets;

head without median groove or long hairs on frons and vertex. Genitalia as illustrated; subgenital plate concave apically with pointed protrusion on mid-line, genital digit ovoid; three longitudinal bars lying above plate internally.

Measurements: Allotype, antenna 1.2 mm.; wing length 2.0 mm.; wing width 0.8 mm. Paratypes, antenna 1.1 mm.; wing length 1.7-1.9 mm.; wing width 0.6-0.7 mm.

Holotype, male (US 63992), Pukusrik, Kusaie, mangrove, Apr. 2, 1953, Clarke; allotype, female (US), same data. Paratypes (BISHOP): Five females, same data as for holotype; female, same locality, Feb. 13, 1953, Clarke.

Other specimens: Colonia, Ponape, 16 m., Jan. 7, 1953, Gressitt; Mt. Unibot, Ton (Tol), Truk, Dec. 31, 1952, Gressitt; S. Yap I., Yap, July-Aug. 1950, Goss; Ngiwal, Babelthuap, Palau, May 19, 1957, Sabrosky; Ngaremlengui, Babelthuap, Palau, June 3, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau, Truk, Ponape, Kusaie).

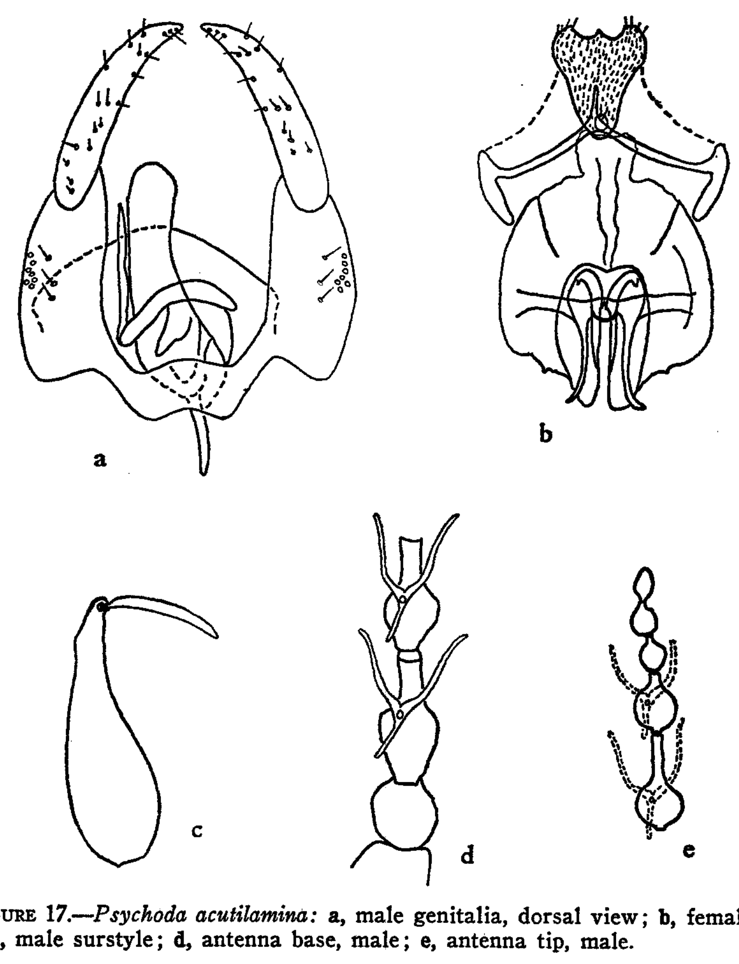


FIGURE 17.—*Psychoda acutilamina:* **a**, male genitalia, dorsal view; **b**, female genitalia; **c**, male surstyle; **d**, antenna base, male; **e**, antenna tip, male.

The two species, *P. hemicorcula* and *acutilamina,* are closely related forms distinguishable from other Micronesian *Psychoda* by their large size, 16-segmented antenna, and structures of the genitalia. The wings are moderately narrow and acutely pointed. The median groove on the head of the males is also distinctive.

These species are separated easily from each other in the female sex by the obvious differences in the apical outline of the subgenital plate. However, the males are very similar and apparently differ only in the shape of the aedeagus.

Several undescribed specimens in the Micronesian collections are related to *hemicorcula* and *acutilamina,* but differ in important respects. There is some indication of geographical differentiation, but the limited series available does not admit definite conclusions.

15. Psychoda aponesos Quate, n. sp. (fig. 18, *a-e*).

Male: Eyes separated by distance equal to less than one-half a facet; eye bridge with four rows of facets; frons covered with hair, band extending posteriorly between eyes nearly to upper eye margin, but not joining hair on vertex. Labellum with four teeth and three spines; ratio of palpal segments 8:10:11:14 (ratio of last segment 16 in some paratypes). Antenna with 16 segments; terminal three reduced in size, clearly separated from each other and 13; sensory filament Y-shaped.

Wing with bases of R_3 and M_2 complete; veins without brown spots at tips; ratio of $R_{2+3}:R_2:R_3 = 4:5:6$ (5:4:6 in paratypes).

Genitalia as illustrated; aedeagus bipartite, lateral shaft strongly arched at base, tip not extending to tip of main shaft; surstyle of usual elongate *Psychoda* shape.

Measurements: Holotype, antenna 0.9 mm.; wing length 1.2 mm.; wing width 0.5 mm. Paratypes, antenna 0.8-1.0 mm.; wing length 1.1-1.3 mm.; wing width 0.5-0.6 mm.

Female: Similar to male. Eyes separated by distance equal to one (to 1.5) facet; subgenital plate with moderately deep apical concavity, sides of apical lobes parallel; genital digit with three apical spines.

Measurements: Allotype, antenna 0.8 mm.; wing length 1.3 mm.; wing width 0.5 mm. Paratypes, antenna 0.8-0.9 mm.; wing length 1.3-1.6 mm.; wing width 0.5-0.6 mm.

Holotype, male (US 63993), Ton, Truk, light trap, Jan. 1, 1953, Gressitt; allotype, female (US), same data. Paratypes (US, BISHOP), all Truk: Four males, four females, same data as for holotype; female, Mt. Unibot, Ton, 390 m., light trap, Feb. 3, 1953, Gressitt; base of Mt. Unibot, light trap, Dec. 31, 1952, Gressitt; female, Wena, 183 m., July 31, 1946, Townes; male, Mt. Chukumong, Wena, 80 m., light trap, Feb. 6, 1953, Gressitt.

Other specimens, Palau: One, Ngaiangl (Kayangel), Dec. 16, 1952, Gressitt; one, Babelthuap, Dec. 22, 1947, Dybas; three, southwest of Ulimang, Babelthuap, beating vegetation, Dec. 12, 20, 1947, Dybas; two, Ngiwal, Babelthuap, May 20, 1957, Sabrosky; four, Ngaremlengui, Babelthuap, June 1, 1957, Sabrosky; two, Melekeiok, Babelthuap, May 22, 1957, Sabrosky; three, Imeliik, Babelthuap, June 6, 1957, Sabrosky; two, Koror, Sept. 16, 1952, Beardsley; one, Koror, May 8, 1938, Murakami; three, Koror, May 30, 1957,

Sabrosky; two, Koror, preserved fish, Apr. 29, 1957, Sabrosky; three, Ngarmalk ("NW Auluptagel"), 25 m., Dec. 13, 1952, Gressitt; one, Mt. Amiangal, Peleliu, Dec. 22, 1952, Gressitt; one, Peleliu, Aug. 30, 1945, Dybas.

Other specimens, Yap, Yap: Three, July-Aug. 1950, Goss; one, Hill behind Yaptown, 50 m., Dec. 3, 1952, Gressitt; three, Dugor, Weloy, Jan. 6, 1957, Sabrosky.

Other specimen, Ponape: One, Mt. Temwetemwensekir, 180 m., Jan. 16, 1953, Gressitt.

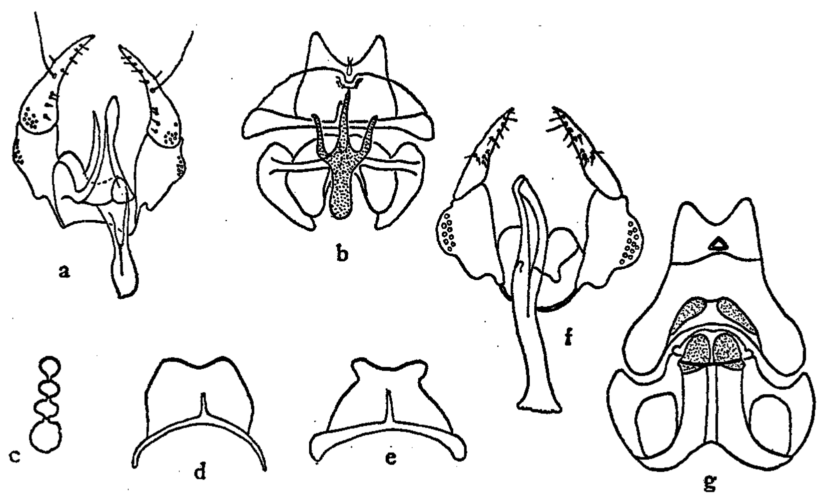


FIGURE 18.—a-e, *Psychoda aponesos: a,* male genitalia, dorsal view; *b,* female genitalia; *c,* antenna tip, female; *d,* female subgenital plate, Palau specimen; *e,* female subgenital plate, Yap specimen. f, g, *P. cochlearia: f,* male genitalia, dorsal view; *g,* female genitalia.

DISTRIBUTION: Caroline Is. (Palau, Yap, Truk, Ponape).

The 16-segmented antenna and the three spines on the labellum, in place of the usual two, are characters which will help identify this species.

Geographical variation is present in this species and is evident by the shape of the female subgenital plate. The plate of the type series from Truk has the sides of the apical part nearly parallel or slightly convergent. In the specimens from Ponape and Yap, there is a noticeable constriction at the base of the apical lobes, making the sides divergent (fig. 18, *e*). The variation of the Palau population has proceeded in the opposite direction and the base of the apical lobes is expanded, making the margin convergent. Also, the apical concavity is more shallow and the membranous lobe on the internal face is smaller in the Palau specimens (fig. 18, *d*) than in the Truk specimens.

16. Psychoda cochlearia Satchell (fig. 18, *f, g*).

Psychoda cochlearia Satchell, 1950, Roy. Ent. Soc. London, Proc. B, **19**: 181 [type, male (BM); Suva].

Male: Eyes separated by distance equal to little less than one facet; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes and joining hair area on vertex. Labellum with four teeth and two spines, median tooth widely separated from other teeth; ratio of palpal segments 8:10:12:14. Antenna with 14 segments; terminal segment small, clearly separated from preceding segment; sensory filament Y-shaped.

Wing with radial and medial forks complete; ratio of $R_{2+3}:R_2:R_3 = 5:4:6$. Genitalia as illustrated; main shaft broadly rounded at apex, lateral shaft short, triangular, tip not extending beyond tip of main shaft; surstyle elongate, of usual *Psychoda* shape.

Measurements: Wing length 1.2-1.5 mm.; wing width 0.5-0.6 mm.

Female: Similar to male. Eyes separated by distance equal to one to two facets. Subgenital plate with apical part parallel-sided, genital digit triangular.

Measurements: Antenna 0.8-0.9 mm.; wing length 1.4-1.8 mm.; wing width 0.5-0.7 mm.

DISTRIBUTION: Fiji, western Caroline Is.

PALAU. BABELTHUAP: Four, Melekeiok, May 22, 1957, Sabrosky. KOROR: One, Ngerabad, May 17, 1957, Sabrosky. PELELIU: One, May 28, 1957, Sabrosky.

YAP. YAP: Six (US, MCZ, BISHOP), July-Aug. 1950, Goss; two, N. Yap, July-Aug. 1950, Goss; one, Kanif, July-Aug. 1950, Goss; two, Dugor, Weloy, Jan. 6, 1957, Sabrosky. GAGIL-TOMIL: Twelve, Gachapar, Gagil, June 19, 1957, Sabrosky; two, Gagil, July-Aug. 1950, Goss.

The specimens from the Caroline Islands agree closely with Satchell's description of *cochlearia*. They differ in having the eyes of the males closer together and more bristles on the dististyle of the male genitalia than noted by Satchell, but these fall well within the limits of specific variation.

17. Psychoda lucubrans Quate, n. sp. (fig. 19, *a-d*).

Male: Eyes separated by distance equal to less than one-half a facet; eye bridge with four rows of facets; frons covered with hair, band extending posteriorly between eyes nearly to upper eye margin, but not joining hair on vertex. Labellum with four teeth and two spines; ratio of palpal segments 7:7:6:10. Antenna with 15 segments, segments 14 and 15 small, clearly separated from each other and 13; sensory filament Y-shaped.

Wing with bases of R_3 and M_2 absent; veins without brown spots at tips.

Genitalia as illustrated; aedeagus simple, elongate; surstyle of usual elongate *Psychoda* shape.

Measurements: Holotype, antenna 0.9 mm.; wing length 1.2 mm.; wing width 0.5 mm.

Female: Similar to male. Eyes separated by distance equal to one facet; subgenital plate with moderately deep apical concavity; genital digit present; hairy, rectangular lobe at base of digit.

Measurements: Allotype, antenna 0.7 mm.; wing length 1.3 mm.; wing width 0.5 mm.

Holotype, male (US 63994), southwest Koror, Palau Is., 25 m., Dec. 5, 1952, Gressitt; allotype, female (US), same locality, Oct. 6, 1952, Beardsley.

DISTRIBUTION: Caroline Is. (Palau).

18. Psychoda mediocris Quate, n. sp. (fig. 19, *e-h*).

Male: Eyes separated by distance equal to about one facet; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes nearly to upper eye margin, but not joining hair on vertex. Labellum with four teeth and two spines; ratio of palpal segments 7:9:8:11. Antenna with 15 segments; segments 14 and 15 subequal in size, clearly separated from each other and 13; sensory filament Y-shaped.

Wing with base of R_3 and M_2 lacking; veins without brown spots at tips.

Genitalia as illustrated; aedeagus simple without lateral shaft; dististyle elongate, moderately slender; surstyle of usual elongate *Psychoda* shape.

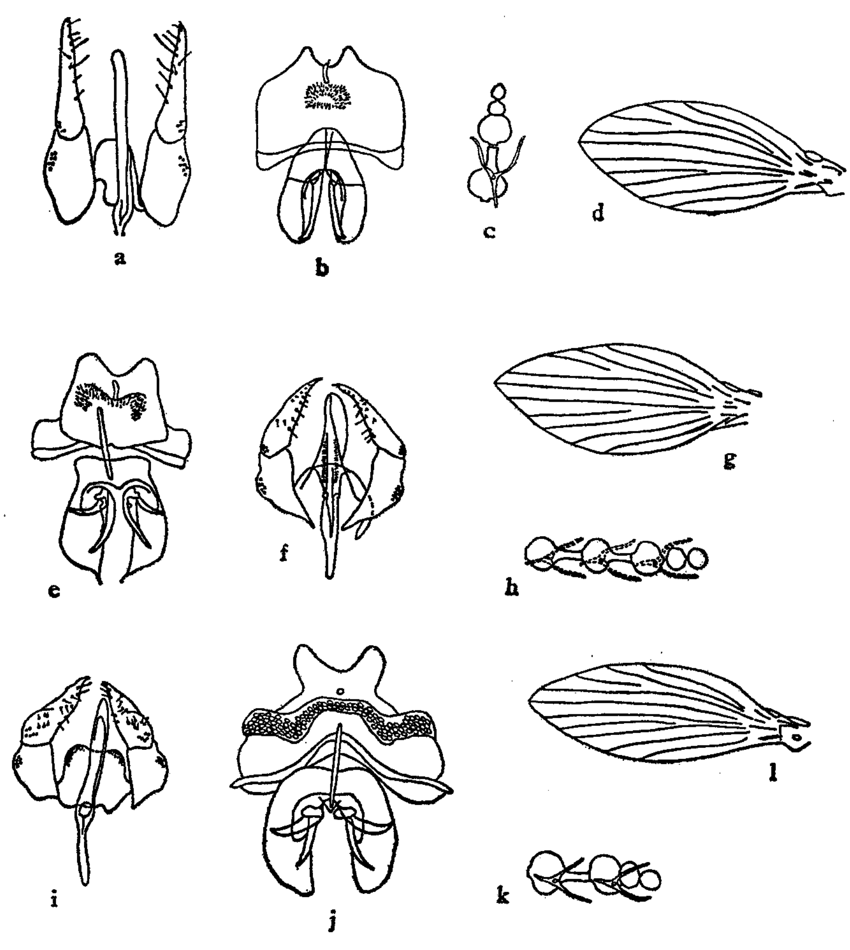


FIGURE 19.—**a-d,** *Psychoda lucubrans: a,* male genitalia, dorsal view; *b,* female genitalia; *c,* antenna tip, male; *d,* wing, male. **e-h,** *P. mediocris: e,* female genitalia; *f,* male genitalia, dorsal view; *g,* wing, male; *h,* antenna tip, female. **i-l,** *P. parsivena: i,* male genitalia, dorsal view; *j,* female genitalia; *k,* antenna tip, male; *l,* wing, female.

Measurements: Holotype, antenna 0.9 mm.; wing length 1.2 mm.; wing width 0.5 mm. Paratypes, antenna ?-0.8 mm.; wing length 1.2-1.4 mm.; wing width 0.5-0.6 mm.

Female: Similar to male. Subgenital plate with sides nearly parallel except at base, genital digit elongate.

Measurements: Allotype, antenna 0.7 mm.; wing length 1.3 mm.; wing width 0.5 mm. Paratypes, antenna 0.7-0.8 mm.; wing length 1.3-1.4 mm.; wing width 0.5-0.6 mm.

Holotype, male (US 63995), Ngaremlengui, Babelthuap, Palau Is., at light, June 2, 1957, Sabrosky; allotype, female (US), same locality, June 4, 1957, Sabrosky. Paratypes (US, BISHOP), Palau: Two males, three females, Koror, Sept. 16, 1952, Beardsley; four females, southwest Koror, 25 m., light trap, Dec. 5, 1952, Gressitt.

Other specimens: Yap, hill behind Yaptown, Yap I., 60 m., Nov. 29, 1952, Gressitt.

DISTRIBUTION: Caroline Is. (Palau, Yap).

The combination of the 15-segmented antenna with the terminal segments separate, the absence of the bases of R_3 and M_2, and the genitalia structure will distinguish this species from other Micronesian species of *Psychoda.*

19. **Psychoda parsivena** Quate, n. sp. (fig. 19, *i-l*).

Male: Very small species with yellowish-white vestiture. Eyes separated by distance equal to 1.5 facets; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes nearly to upper eye margin, but not joining hair on vertex. Labellum with four teeth and two spines; ratio of palpal segments 5.5:6:6:8. Antenna with 15 segments; segments 14 and 15 equal in size, clearly separated from each other and segment 13; sensory filament Y-shaped.

Wing with base of R_3 and M_2 absent; veins without brown spots at tips.

Genitalia as illustrated; aedeagus simple, without lateral shaft; dististyle ending in form of simple claw.

Measurements: Holotype, antenna 0.6 mm.; wing length 1.0 mm.; wing width 0.4 mm.

Female: Similar to male. Eyes separated by distance equal to two facets; genitalia as illustrated.

Measurements: Allotype, antenna 0.7 mm.; wing length 1.05 mm.; wing width 0.4 mm. Paratypes, wing length 1.1-1.2 mm.

Holotype, male (US 63996), Agric. Exper. Sta., Colonia, Ponape, light trap, Jan. 6, 1953, Gressitt; allotype, female (US), same data. Paratypes (US, BISHOP): Three males, three females, same locality as for types, Jan. 6, 7, 15, 1953, Gressitt.

Other specimens, Palau: Southwest Koror, light trap, Dec. 5, 1952, Gressitt.

Other specimens, Truk: Ton I., light trap, Jan. 4, 1953, Gressitt; Ton, Mt. Unibot, 200 m., Dec. 30, 1952, Gressitt.

DISTRIBUTION: Caroline Is. (Palau, Truk, Ponape).

20. **Psychoda alternata** Say (fig. 20, *a-c*).

Psychoda alternata Say, 1824, Narrative Exped. Source St. Peter's River 2: 358.—Edwards, 1928, Federated Malay States Mus., Jour. **14**: 64.—

del Rosario, 1936, Philippine Jour. Sci. **59**: 559.—Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 61.—Quate, 1955, Univ. Calif. Pub. Ent. **10**: 218.

Psychoda conspicillata Hutton, 1881, Cat. New Zealand Dipt., 13.

Female: Eyes separated by distance equal to one to three facets; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes but not joining hair area of vertex. Labellum usually with six teeth and three or four spines; ratio of palpal segments 9:10:9:13. Antenna with 15 segments; segments 13 and 14 broadly fused, 15 separated, very small, button-like; sensory filament Y-shaped with short branches.

Wing with radial and medial forks complete; ratio of $R_{2+3}:R_2:R_3 = 8:7:11$; longitudinal veins with brown spots at tips.

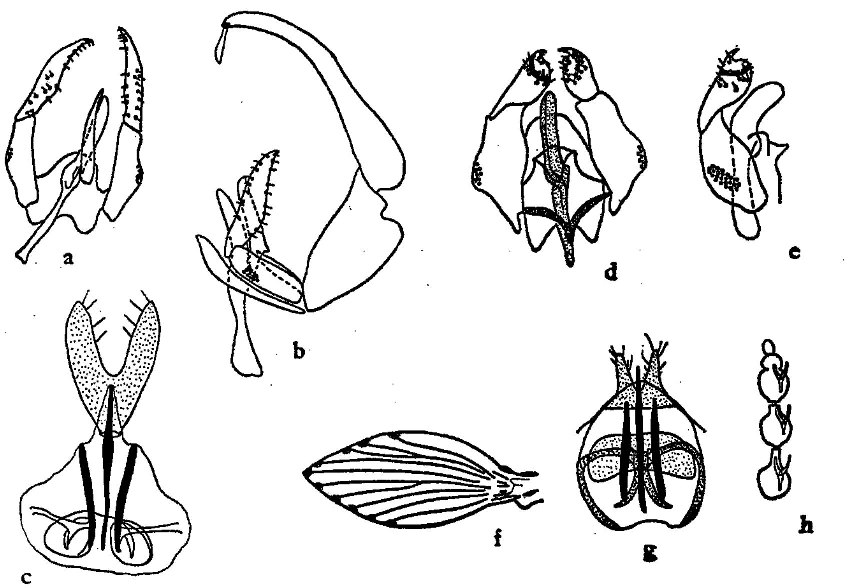


FIGURE 20.—**a-c**, *Psychoda alternata: a,* male genitalia, dorsal view; *b,* male genitalia, lateral view; *c,* female genitalia. **d-h**, *P. acanthostyla: d,* male genitalia, dorsal view; *e,* male genitalia, coxites and aedeagus, lateral view; *f,* wing, female; *g,* female genitalia; *h,* antenna tip, female.

Female genitalia as illustrated; subgenital plate V-shaped, three longitudinal bars above plate, without genital digit.

Measurements: Antenna 0.8-1.2 mm.; wing length 1.4-3.0 mm.; wing width 0.7-1.3 mm.

Male: Similar to female. Dististyle elongate, not ending in sharp spur; surstyle of usual elongate *Psychoda* shape.

Measurements: Antenna 1.0-1.2 mm.; wing length 1.2-2.3 mm.; wing width 0.5-0.9 mm.

DISTRIBUTION: Cosmopolitan, Australia, New Zealand, Fiji, Samoa, Hawaiian Is., Japan, Bonin Is., Caroline Is., Mariana Is.

BONIN IS. CHICHI JIMA: Futami-ko (Omura, Port Lloyd), May 10, 1956, Clagg; one, Omura, "Camp Beach," Apr. 2-25, 1958, Snyder.

S. MARIANA IS. GUAM: One, Libugon farm, July 10, 1936, Swezey; two, Piti, Oct. 27, 1936, Swezey; one, Nimitz Hill, May 10, 1956, Clagg.

PALAU. KOROR: Four, Sept. 16, 1952, Beardsley; 32, Apr. 18-22, July 24, 1957, Sabrosky; one, southwest, Dec. 5, 1952, Gressitt; two, Arabaketsu, Feb. 3, 1938, Murakami.

YAP. YAP: Five, Dugor, July-Aug. 1950, Goss; one, Dugor, Weloy, Jan. 6, 1957, Sabrosky.

TRUK. One, Olej I., Apr. 8, 1940, Yasumatsu and Yoshimura.

PONAPE. Three (US, MCZ), Madolenihm (Matalanim) Plantation, June-Sept. 1950, Adams; one, Agric. Exper. Sta., Colonia, light trap, Jan. 6, 1953, Gressitt.

This widespread species is common in many parts of the world and is easily distinguished from other species of *Psychoda* by the brown spots at the tips of the veins. A few other allied species also share this and other features with *alternata* and together they constitute the *alternata* complex. One such species occurs in Micronesia and would be the only species likely to be confused with *alternata*. However, the shape of the female subgenital plate and male diststyle readily separate the two.

21. Psychoda acanthostyla Tokunaga (fig. 20, *d-h*).

Psychoda acanthostyla Quate (MS), Tokunaga, 1957, Saikyo Univ. Agric., Sci. Rept. 9: 53 (Formosa).

Female: Eyes separated by distance equal to 1.5 facets; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes but not joining hair area on vertex. Labellum with five teeth and two spines; ratio of palpal segments 8: 10: 8: 11. Antenna with 15 segments; segments 13 and 14 broadly fused, 15 separated, very small, button-like; sensory filament Y-shaped with short branches.

Wing with radial and medial forks complete, on about same level; ratio of R_{2+3}: R_2: R_3 = 5: 6: 8; veins with brown spots at tips.

Genitalia as illustrated; subgenital plate U-shaped, three longitudinal bars above plate, without genital digit.

Measurements: Antenna 0.6-0.7 mm.; wing length 1.3-1.6 mm.; wing width 0.5-0.7 mm.

Male: Similar to female. Eyes separated by distance equal to one-half a facet. Dististyle short, ending in sharp spur preceded by concavity and number of short spines; surstyle of usual elongate *Psychoda* shape.

Measurements: Antenna ?-0.7 mm.; wing length 1.1-1.4 mm.; wing width 0.5-0.6 mm.

DISTRIBUTION: Formosa, S. Mariana Is., western Caroline Is.

S. MARIANA IS. SAIPAN: Chalan Kanoa (Charan Canoa), Aug. 21, 1944, Hall.

PALAU. BABELTHUAP: Ngiwal, May 20, 1957, Sabrosky; Ngaremlengui, June 1-3, 1957, Sabrosky; Melekiok, May 22, 1957, Sabrosky. KOROR: Apr. 29, 1957, preserved fish, Sabrosky; July 26, 1956, McDaniel; Oct. 5, 1952, Beardsley; Nov. 26, 1947, Dybas.

YAP. YAP: July-Aug. 1950, Goss; Kanif, July-Aug. 1950, Goss; Dugor, July-Aug. 1950, Goss; Hill behind Yaptown, 50 m., Dec. 3, 1952, Gressitt; Weloy, Jan. 6-14, 1957, Sabrosky; N. Yap, July-Aug. 1950, Goss. GAGIL-TOMIL: Tomil, July-Aug. 1950, Goss; Gagil, July-Aug. 1950, Goss; Gachapar, June 19, 1957, Sabrosky.

Tokunaga validated Quate's manuscript name by describing *Psychoda acanthostyla* and thereby became the author of the name.

This species is easily separable from most other species of *Psychoda* by the brown spots at the tips of the veins and the 15-segmented antenna with the small, button-like terminal segment. It is closely allied to *alternata,* but differs from that species by the shape of the female and male genitalia.

The males of the species of the *alternata* complex are usually very similar and differ only in the shape of the aedeagus. This is not so with *acanthostyla* which has an unusually shortened dististyle, ending in a finger-like spur unlike that of any of its relatives.

22. **Psychoda ichthycerca** Quate, n. sp. (fig. 21, *a-c*).

Male: Unknown.

Female: Eyes separated by distance equal to 1.5 facets; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes and joining hair area on vertex. Labellum with four teeth and two spines; ratio of palpal segments 7:8:8:11. Antenna with 15 segments; terminal two segments small, clearly separated from each other and preceding segment; sensory filament Y-shaped.

Wing with radial and medial forks incomplete, bases of R_2 and M_2 absent.

Genitalia as illustrated; subgenital plate with apical part in shape of fish tail; genital digit rod-like, elongate, slender.

Measurements: Holotype, antenna 0.6 mm.; wing length 1.3 mm.; wing width 0.5 mm. Paratypes, wing length 1.2-1.4 mm.; wing width 0.5-0.6 mm.

Holotype, female (US 63998), Yap, Yap Is., July-Aug. 1950, Goss. Paratypes (BISHOP), two females, same data as for holotype.

Other specimens: Female, Fadian, Guam, Sept. 18, 1942, *ex* rotten bark, Swezey; female, Libugon farm, Guam, July 10, 1946, Swezey.

DISTRIBUTION: Western Caroline Is. (Yap), S. Mariana Is. (Guam).

This species is similar to *Psychoda dennesi* Satchell (1953, Australian Jour. Zool. **1**: 375), but differs in the following respects: The antenna of *ichthycerca* is 15-segmented but 16-segmented in *dennesi* and the radial and medial forks of *ichthycerca* are incomplete, but complete in *dennesi.* The distinctive fish-tail shape of the subgenital plate is similar in both species.

23. **Psychoda adumbrata** Satchell (fig. 21, *d-g*).

Psychoda adumbrata Satchell, 1953, Roy. Ent. Soc. London, Proc. B, **22**: 181.

Male: Vestiture white with three brown bands across wing and brown patch at wing base.

Eye bridges contiguous, inverted, V-shaped notch on anteromedian margin; eye bridge with four rows of facets; frons covered with hair on disc with triangular projection

directed posteriorly on mid-line. Labellum with four teeth and two spines; ratio of palpal segments 7:6:6:8, palpal segment 1 with small membranous vesicle on mediodistal angle. Antenna with 15 segments; segment 14 very small, may not be recognized as additional segment, broadly fused to 13, 13 and 14 bearing setose tubercles, 15 pyriform, separated from 14; sensory filament Y-shaped.

Wing with bases of forks complete; infuscate areas on veins and membrane forming three incomplete transverse bands, one little before level of medial fork, one little beyond halfway from fork to apex, and one subapical, similar infuscate area at base of wing adjacent to fold; ratio of $R_{2+3}:R_2:R_3 = 4:4:6$.

Genitalia as illustrated; diststyle curiously shaped, hook-like from lateral view.

Measurements: Antenna 0.8-0.9 mm.; wing length 1.1-1.5 mm.; wing width 0.5-0.6 mm.

Female: Similar to male; eyes also contiguous. Genitalia as illustrated; subgenital plate with small, stout, Y-shaped apical piece, genital digit cylindrical, elongate, bearing one long apical spine.

Measurements: Antenna 0.8 mm.; wing length 1.3-1.6 mm.; wing width 0.6-0.7 mm.

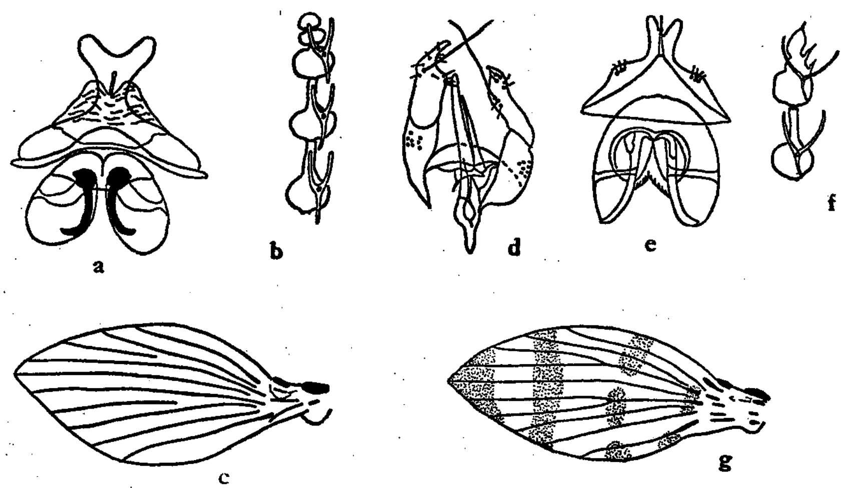


FIGURE 21.—a-c, *Psychoda ichthycerca:* *a.* female genitalia; *b,* antenna tip, male; *c,* wing, male. d-g, *P. adumbrata:* *d,* male genitalia, dorsal view; *e,* female genitalia; *f,* antenna tip, male; *g,* wing, male.

DISTRIBUTION: Samoa, central and western Caroline Is.

PALAU. BABELTHUAP: One, Ngaremeskang, 25 m., Dec. 20, 1952, Gressitt; one, Ngaremlengui, June 1, 1957, Sabrosky; five, Imeliik, June 6, 1957, Sabrosky. NGARMALK ("NW Auluptagel"): One, 25 m., Dec. 13, 1952, Gressitt.

TRUK. WENA (Moen): Three, 150 m., light trap, Dec. 27, 1952, Gressitt; three, 80 m., Dec. 28, 1952, Gressitt.

This species is one of the few species of *Psychoda* in which pinned specimens can be easily identified. The white vestiture and three brown bands across the wing make its identification simple. The shapes of the male and female

genitalia are greatly divergent from other *Psychoda* and slide-mounted specimens should also be easily recognized.

24. **Psychoda yapensis** Quate, n. sp. (fig. 22, *a, b*).

Male: Vestiture uniformly dark gray without markings. Eyes separated by distance equal to one facet; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes and joining hair area on vertex. Labellum with four teeth and two spines; ratio of palpal segments 8:9:10:12. Antenna with 14 segments; terminal segment small, clearly separated from preceding segment; sensory filament Y-shaped.

Wing with radial and medial forks complete; ratio of $R_{2+3}:R_2:R_3 = 5:4:6$; membrane lightly infuscate, little darker in costal and anal cells.

Genitalia as illustrated; main shaft straight and slender, lateral shaft slender with slight curvature; dististyle with bristly projection near center; surstyle elongate of usual *Psychoda* shape.

Measurements: Holotype, antenna 0.9 mm.; wing length 1.3 mm.; wing width 0.5 mm.

Female: Similar to male. Eyes separated by distance equal to 1.5 facets. Subgenital plate with sides of apical part slightly converging; U-shaped, sclerotized structure resembling horse collar on internal face at base of lobes; genital digit very short with four apical setae.

Measurements: Allotype, antenna 0.8 mm.; wing length 1.4 mm.; wing width 0.6 mm. Paratypes, antenna 0.7-0.8 mm.; wing length 1.3-1.6 mm.; wing width 0.5-0.6 mm.

Holotype, male (US 63999), Yap, Yap, July-Aug. 1950, Goss; allotype, female (US), same data. Paratypes (US, MCZ, CM, BISHOP), Palau: Two females, Ngiwal, Babelthuap, 1 m., light trap, Dec. 16, 1952, Gressitt; female, Ulimang, Babelthuap, Dec. 13, 1947, Dybas; female, Koror, light trap, Sept. 16, 1952, Beardsley. Paratypes, Yap: Five males, 15 females, same data as for holotype; three males, female, Kanif, Yap, July-Aug. 1950, Goss; two females, S. Yap, July-Aug. 1950, Goss; six females, Tomil, Gagil-Tomil, July-Aug. 1950, Goss; female, Gagil, Gagil-Tomil, July-Aug. 1950, Goss. Paratype, Truk: Female, Olej, Ton, Apr. 8, 1940, Yasumatsu and Yoshimura. Paratype, Ponape: Female, Colonia, 16 m., light trap, Jan. 7, 1953, Gressitt. Paratypes, Kusaie: Three females, Mutunlik, light trap, Jan. 24, 1953, Gressitt.

Other specimens: Six, Dugor, Weloy, Yap, Yap, June 1, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau, Yap, Truk, Ponape, Kusaie).

This species is most easily separated from other *Psychoda* by the projection on the male dististyle and "horse collar" structure on the internal face of the female subgenital plate at the base of the apical lobes.

25. **Psychoda rarotongensis** Satchell.

Psychoda rarotongensis Satchell, 1953, Roy. Ent. Soc. London, Proc. B, 22: 183.—Quate, 1955, Univ. Calif. Pub. Ent. **10**: 208.

Psychoda lucia Quate, 1954, Hawaiian Ent. Soc., Proc. **15**: 249.

Male: Eyes narrowly separated by distance equal to less than one-half a facet; eye bridge with four rows of facets; frons covered with hair on disc, median band of hair extending posteriorly to vertex. Labellum with four teeth and two spines, ratio of palpal segments 8:8:8:12. Antenna with 15 segments; segment 14 broadly fused to 13 and may

not be recognized as additional segment, bearing setose tubercle, 15 pyriform, clearly separated from 14; sensory filament composed of three anterior and one posterior branches.

Wing with radial and medial forks complete; ratio of $R_{2+3}: R_2: R_3 = 10:9:13$; veins without brown spots at tips.

Genitalia with basistyle short and expanded laterally, dististyle with very long spine; surstyle elongate of usual *Psychoda* shape.

Measurements: Antenna 0.9-1.0 mm.; wing length 1.0-1.3 mm.; wing width 0.5-0.6 mm.

Female: Similar to male. Eyes separated by distance equal to one facet; sensory fila-

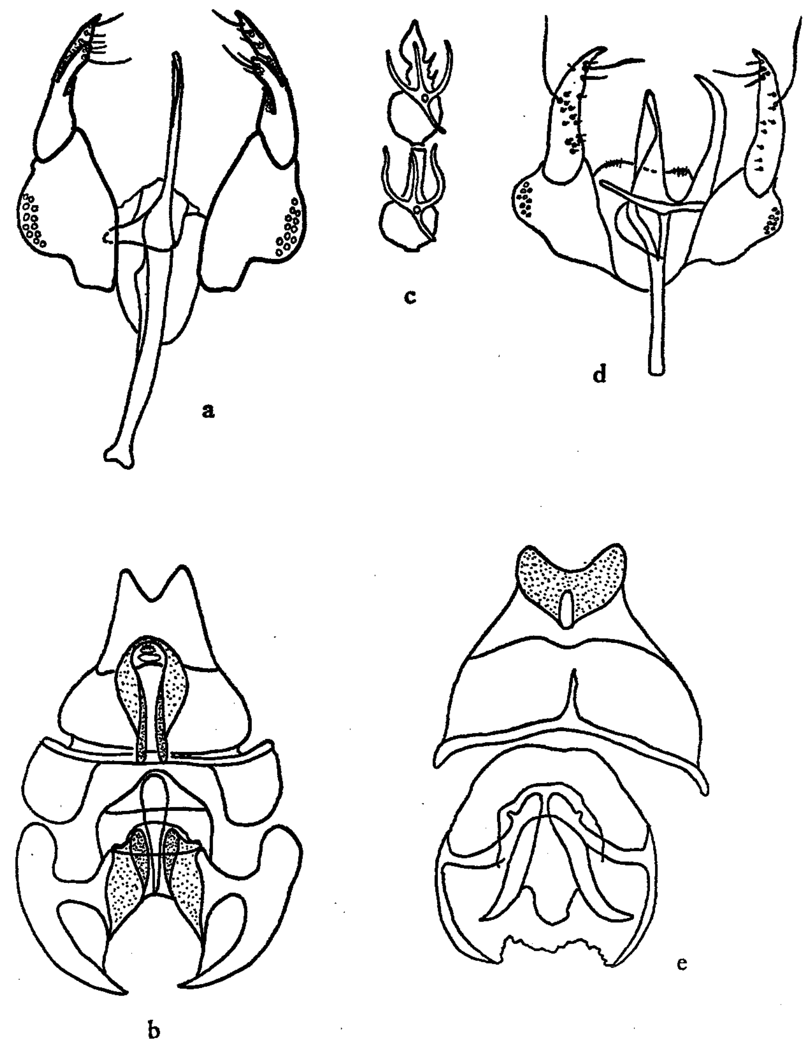


FIGURE 22.—a, b, *Psychoda yapensis: a,* male genitalia, dorsal view; *b,* female genitalia. c-e, *P. quadrifilis quadrifilis: c,* antenna tip, male; *d,* male genitalia, dorsal view; *e,* female genitalia.

ment of antenna with two anterior and one posterior branches. Subgenital plate of genitalia broad with shallow apical concavity, rosette-like structure internally at base of apical lobe.

Measurements: Antenna 0.7-0.8 mm.; wing length 1.1-1.5 mm.; wing width 0.5-0.6 mm.

DISTRIBUTION: United States, West Indies, Hawaiian Is., Cook Is., Solomon Is., Caroline Is.

PALAU. BABELTHUAP: One, Imeliik, June 6, 1957, Sabrosky; three, Melekeiok, May 22, 1957, Sabrosky; 20, Ngiwal, May 20, 1957, Sabrosky; three, Ngaremlengui, June 4, 1957, Sabrosky. KOROR: 15, southwest, 25 m., light trap, Dec. 5-18, 1952, Gressitt; four, preserved fish, April 29, 1957, Sabrosky. PELELIU: Two, north-central, at light, Aug. 10, 1945, Dybas; one, Aug. 1945, Hagen.

YAP. YAP: 29, July-Aug. 1950, Goss; two, N. Yap, July-Aug. 1950, Goss; two, Dugor, Weloy, light trap, Jan. 6, 1957, Sabrosky; six, S. Yap, July-Aug. 1950, Goss; nine, Kanif, July-Aug. 1950, Goss. GAGIL-TOMIL: 14, Tomil, July-Aug. 1950, Goss; one, Gagil, July-Aug. 1950, Goss; two, Gachapar, Gagil, at light, June 19, 1957, Sabrosky.

TRUK. WENA (Moen): Two, 180 m., July 31, 1946, Townes; one, Mt. Chukumong (Teroken) north, 80 m., light trap, Feb. 5, 1953, Gressitt. TON (Tol): One, Mt. Unibot, 390 m., light trap, Feb. 3, 1953, Gressitt.

PONAPE. One, Colonia, June-Sept. 1950, Adams; one, Mt. Temwetemwensekir, 200 m., light trap, Jan. 11, 1953, Gressitt; one, Agric. Exper. Sta., Colonia, 16 m., light trap, Jan. 11, 1953, Gressitt.

This small species of *Psychoda* is not difficult to separate from other species of the genus. The male and female genitalia, illustrated in the three references cited, are distinctive and unlike any other.

A widespread species in the Pacific basin, *rarotongensis* also occurs as far from there as Florida and the West Indies. It is probably distributed by commerce and may be found to be worldwide in temperate and tropical areas.

26. Psychoda quadrifilis quadrifilis Edwards (fig. 22, *c-e*).

Psychoda quadrifilis Edwards, 1928, Insects of Samoa, Dipt. 2(6): 73.

Psychoda hardyi Quate, 1954, Hawaiian Ent. Soc., Proc. **15**: 348 (n. syn.).

Male: Vestiture chiefly dark gray, vestiture of antenna and legs dark brown. Eyes separated by distance equal to one facet; eye bridge with four rows of facets; interocular suture sometimes present; frons covered with hair, band of hairs extending posteriorly between eyes joining hair area of vertex. Labellum with four teeth and two spines; first palpal segment with small, rounded tubercle on medial, apical margin, ratio of segments 10: 10: 10: 14. Antenna with 15 segments (originally stated to be 14); segment 14 broadly fused to 13, may not be recognized as additional segment, bearing two setose tubercles, segment 15 small, pyriform, clearly separated from 14; sensory filament with three anterior and one posterior branches.

Wing with radial and medial forks complete; ratio of R_{2+3}: R_2: R_3 = 10: 10: 13; veins without brown spots at tips.

Male genitalia as illustrated; dististyle enlarged near center, bearing number of long and short bristles; lateral shaft of aedeagus very long, broad, swordlike; surstyle of usual elongate *Psychoda* shape; paramere minutely setose.

Measurements: Antenna 0.8-1.1 mm.; wing length 1.1-1.5 mm.; wing width 0.4-0.7 mm.

Female: Similar to male. Eyes separated by distance equal to two facets; band of hairs between eyes not joining hair of vertex. Subgenital plate with sinuous, dark bar on mid-line arising from base and extending posteriorly halfway to apex; genital digit cylindrical.

Measurements: Antenna 0.8-1.1 mm.; wing length 1.5-2.0 mm.; wing width 0.6-0.9 mm.

DISTRIBUTION: Hawaiian Is., Marshall Is., Caroline Is., Samoa.

CAROLINE ATOLLS. WOLEAI: Six, Utagal, July 28, 1946, Townes.

TRUK. WENA (Moen): 549 m., July 31, 1946, Townes; one, Mt. Chukumong (Teroken), 80 m., light trap, Dec. 27, 1952, Gressitt. TON (Tol): Three, light trap, Jan. 4, 1953, Gressitt; six, Mt. Unibot, 200-390 m., light trap, Dec. 30, 1952, Feb. 3, 1953, Gressitt.

PONAPE. 14, Colonia, June-Sept. 1950, Adams; one, Agric. Exper. Sta., Colonia, Jan. 16, 1953, Gressitt; one, southeast Nanpohnmal, cut native forest, 70 m., Jan. 11, 1953, Gressitt; one, Mt. Temwetemwensekir, 180 m., light trap, Jan. 19, 1953, Gressitt.

KUSAIE. Seven, Mutunlik (Yepan), 16 m., light trap, Jan. 24, 1953, Gressitt; five, Mutunlik, 22 m., light trap, Jan. 21, 26, 1953, Clarke; one, Pukusrik, 1 m., Feb. 13, 1953, Clarke; one, Hill 541, 165 m., light trap, Mar. 25, 1953, Clarke; one, Hill 1010, 300 m., light trap, Apr. 13, 1953, Clarke.

MARSHALL IS. MAJURO: One, Aug. 28, 1946, Townes.

The tip of the antenna, the female subgenital plate, and the male coxite and surstyle of *quadrifilis,* as illustrated by Edwards, coincide closely with those of *hardyi,* with the exception of the basistyle, which appears more swollen than in *hardyi.* However, this may merely be a difference in the position of the specimens on the slide. Edwards fails to illustrate the female spermatheca and male aedeagus which would definitely confirm the above synonymy. However, the recent discovery of *hardyi* in Samoa (unpublished data) supports the morphological evidence and there seems little justification for retaining *quadrifilis* and *hardyi* as separate species.

27. Psychoda quadrifilis hespera Quate, n. subsp. (fig. 23, *a*, *b*).

Male: Vestiture on antenna and legs brown, body light brown, wings pale. Tomentum on thorax, base of wing, coxae and femora. Dististyle of genitalia with slight swelling; paramere setose. Otherwise similar to *P. quadrifilis qualrifilis.*

Measurements: Holotype, antenna broken; wing length 1.5 mm.; wing width 0.6 mm. Paratypes, antenna 0.9 mm.; wing length 1.3 mm.; wing width 0.6 mm.

Female: Similar to *P. q. quadrifilis,* but differs in structure of genitalia as illustrated.

Measurements: Allotype, antenna 0.9 mm.; wing length 1.5 mm.; wing width 0.7 mm. Paratypes, antenna 0.7-0.9 mm.; wing length 1.3-1.7 mm.; wing width 0.5-0.7 mm.

Holotype, male (US 64000), Yap, Hill behind Yaptown, Yap, 60 m., light trap, Nov. 29, 1952, Gressitt; allotype, female (US), same locality, 50 m., Dec. 3, 1952, Gressitt. Paratypes (US, BISHOP), all Yap, Yap: Male, three females, same data as for holotype; two females, same data as for allotype;

two females, same locality, Nov. 28, 1952, Gressitt; six females, same locality, Dec. 1, 1952, Gressitt; male, near Yaptown, July 14, 1946, Townes.

Other specimens, Palau: One, Ngaiangl, Dec. 16, 1952, Gressitt; three, Imeliik, Babelthuap, June 6, 1957, Sabrosky; one, Ngaremlengui, Babelthuap, June 2, 1957, Sabrosky; one, Koror, June 7, 1938, Murakami.

Other specimens, Yap: One, Kanif, July-Aug. 1950, Goss; six, Dugor, Weloy, Jan. 6-14, 1957, Sabrosky.

Other specimens, Ponape: Two, Mt. Temwetemwensekir, 180 m., Jan. 16, 1953, Gressitt.

DISTRIBUTION: Caroline Is. (Palau, Yap, Ponape).

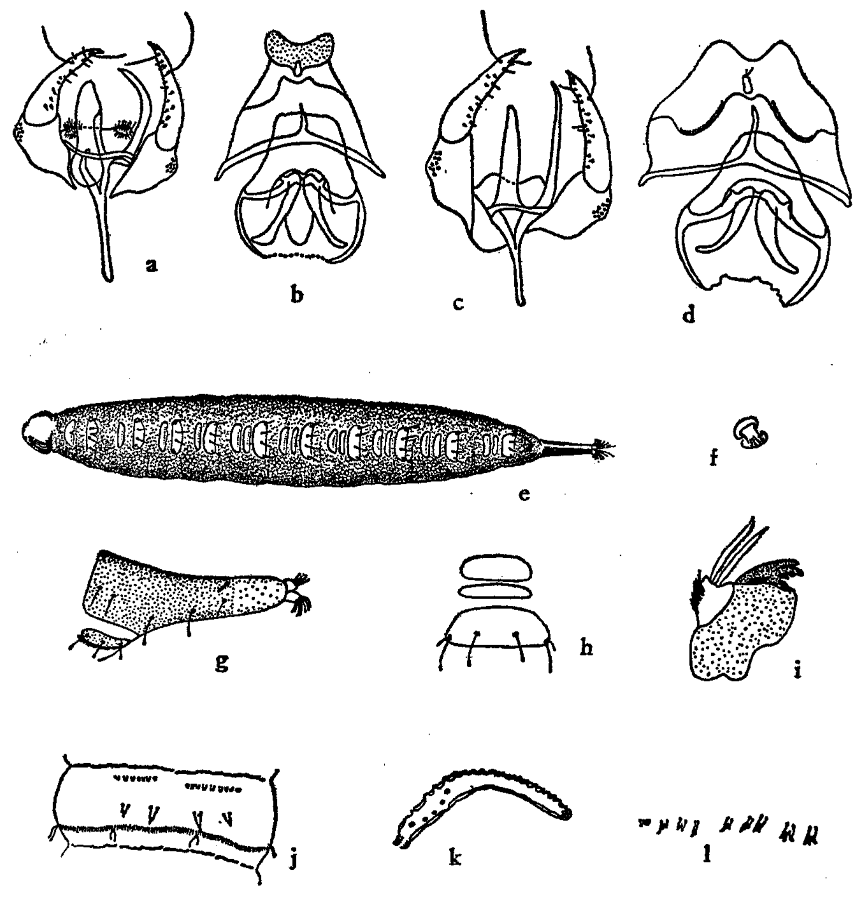


FIGURE 23.—a, b, *Psychoda quadrifilis hespera: a,* male genitalia, dorsal view; *b,* female genitalia. c-l, *P. q. guamensis: c,* male genitalia, dorsal view; *d,* female genitalia; *e,* larva, dorsal view; *f,* antenna, larva; *g,* siphon, lateral view, larva; *h,* tergal plate, larva; *i,* mandible, larva; *j,* sternite, pupa; *k,* respiratory horn, pupa; *l,* spines on anterior part of sternite, pupa.

28. Psychoda quadrifilis guamensis Quate, n. subsp. (fig. 23, *c-h*).

Psychoda sp. *a* Bohart and Gressitt, 1951, B. P. Bishop Mus., Bull. **204**: 62.

Male: Vestiture pale, whitish brown with vestiture of antenna and legs brown. No tomentum on thorax. Genitalia with lateral shaft of aedeagus nearly straight; diststyle elongate, not enlarged; paramere minutely setose on medial face. Otherwise similar to *P. q. quadrifilis* and *P. q. hespera.*

Measurements: Holotype, antenna 0.9 mm.; wing length 1.3 mm.; wing width 0.5 mm. Paratypes, antenna 0.8-0.9 mm.; wing length 1.2-1.5 mm.; wing width 0.5-0.7 mm.

Female: Similar to *P. q. quadrifilis,* but differs markedly in structure of genitalia as illustrated.

Measurements: Allotype, antenna 0.9 mm.; wing width 0.7 mm. Paratypes, wing length 1.7 mm.; wing width 0.7 mm.

Mature larva: Tergal plates present on all body segments, two each on segments 1 to 4, three on segments 5 to 10, details as illustrated. Body covered with small plaques in addition to plates, each plaque bearing single, simple seta; venter with three to five bare plaques near lateral margin of each segment, bare plaques two to five times larger than small plaques with setae.

Siphon tube as illustrated, about seven times as long as terminal width; sensillum rod-like, blunt, without terminal hair.

Length 3.3 to 3.8 mm.

Pupa: Respiratory horn about eight times as long as central width, without darkened area. Abdominal tergites with two clusters of about eight bristles on each side of mid-line, one cluster near mid-line, the other about halfway between mid-line and side; posterior margin of tergites with uniform row of close-set setae as on sternites; sternites as illustrated.

Length 2.2 to 2.6 mm.

Holotype, male (US 64001), Guam, *ex* breadfruit, 1945, G. Bohart and Gressitt (associated with pupal skin); allotype, female (BISHOP), Pt. Oca, Guam, at light, June 14, 1945, Bohart and Gressitt. Paratypes (US, CAS, BISHOP), all Guam: Seven males, same data as for holotype; female, same locality as for allotype, June 30, 1945, Bohart and Gressitt; male, female, southeast coast, May 9, 1945, Bohart and Gressitt; male, Piti, *ex* rotten breadfruit, May 31, 1936, Swezey.

DISTRIBUTION: S. Mariana Is. (Guam).

This species is undoubtedly the form which Bohart and Gressitt (1951) observed occurring abundantly in decomposing organic matter on Guam. The above-listed specimens were the only ones in the Micronesian material collected by these two authors and their description most closely fits *guamensis*. Their description and illustrations do not allow positive identification, but all evidence indicates *guamensis* is the same as their species *a*.

Psychoda quadrifilis is one of the few Micronesian psychodids which has segregated into geographical races. *P. q. quadrifilis* and *hespera* in the Caroline Islands are the most closely related of the three subspecies and are probably more recently separated than *guamensis*. At the present time *quadrifilis* and *hespera* occur together on Ponape. The majority of the specimens from this island belong to *quadrifilis* and only a few are *hespera,* so it is probable that

hespera has been isolated from *quadrifilis* in the western Caroline Islands and recently has spread to the east through commercial transportation. If the subspecies status is correct, it is not expected that the two populations on Ponape will remain distinct.

P. q. guamensis, on the basis of morphological characters, has diverged considerably from *quadrifilis* and *hespera* and might deserve full species rank. However, the close relationship to these other two forms is clear and the close relationship and its allopatric distribution is most clearly expressed by treating it as a subspecies.

P. q. quadrifilis in Micronesia appears identical to *quadrifilis* (=*hardyi*) in the Hawaiian Islands and no significant differences between specimens from these two areas have been found. It would thus seem that the form in the Hawaiian Islands originated from that of eastern Micronesia and the transportation to the east occurred too recently for divergence to have occurred in the populations in these two areas.

29. **Psychoda ochra** Quate, n. sp. (fig. 24, *a-d*).

Female: Vestiture chiefly yellowish white, vestiture of vertex, antenna and legs brown.

Eyes separated by distance equal to one facet; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes nearly to upper eye margin, but not joining hair on vertex. Labellum with three short teeth and two spines; ratio of palpal segments 4:5:5:6. Antenna with 15 segments; segments 13 and 14 broadly fused, 15 clearly separated; sensory filament Y-shaped.

Wing broad, about twice as long as wide, radial and medial forks complete; ratio of $R_{2+3}:R_2:R_3 = 6:5.5:8$; veins without brown spots at tips.

Genitalia as illustrated; spermatheca very large and complex.

Measurements: Holotype, antenna 0.9 mm.; wing length 1.6 mm.; wing width 0.8 mm. Paratypes, wing length 1.5-1.9 mm.; wing length 0.7-0.9 mm.

Male: Similar to female. Diststyle long and narrow, surstyle shortened and thickened.

Measurements: Allotype, wing length 1.6 mm.; wing width 0.7 mm.

Holotype, female (US 64002), Kusaie, Hill 1010, light trap, Apr. 13, 1953, Clarke; allotype, male (US), Ngarmalk (NW Auluptagel), Palau, 25 m., light trap, Dec. 13, 1952, Gressitt. Paratypes (US, BISHOP): Two females, same data as for allotype. Paratypes, all Truk: Female, Mt. Unibot, Ton, 390 m., native forest, Jan. 3, 1953, Gressitt; two females, Ton, light trap, Apr. 1, 1953, Gressitt. Paratype, Ponape: Female, southeast Nanpohnmal, light trap, native forest, Jan. 10, 1953, Gressitt. Paratypes, all Kusaie: Female, Hill 541, light trap, Mar. 25, 1953, Clarke; female, Mutunlik (Yepan), light trap, 16 m., Jan. 23, 1953, Gressitt.

Other specimens, Palau: Babelthuap, Ngaremlengui, June 1, 1957, Sabrosky; Babelthuap, Melekeiok, May 22, 1957, Sabrosky; Koror, preserved fish, Apr. 29, 1957, Sabrosky; Koror, July 24, 1956, McDaniel; Koror, Sept. 16, 1952, Beardsley.

Other specimens, Yap: Dugor, Weloy, Yap, Jan. 6, 1957, Sabrosky.

DISTRIBUTION: Caroline Is. (Palau, Truk, Yap, Ponape, Kusaie).

This species differs from other Micronesian psychodids by the structure of the female genitalia, especially the large, complex spermatheca, and the long, slender dististyle of the male genitalia. The teeth of the labellum are much shorter than in the other species of *Psychoda*.

30. Psychoda gressitti Quate, n. sp. (fig. 24, *e, f*).

Male: Unknown.

Female: Eyes separated by distance equal to 1.5 facets; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes nearly to upper eye margin, but not joining hair area on vertex. Labellum with four teeth and two spines; ratio of palpal segments 8:10:10:13. Antenna with 15 segments; segment 14 very small, may not be recognized as additional segment, broadly fused to 13, bearing setose tubercle, 15 pyriform, separated from 14; sensory filament Y-shaped.

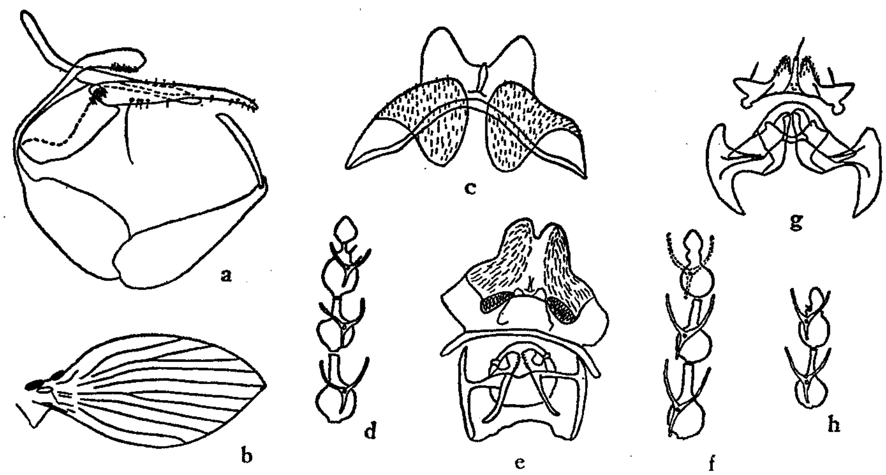


FIGURE 24.—**a-d**, *Psychoda ochra: a,* male genitalia, lateral view; *b,* wing, female; *c,* female genitalia; *d,* antenna tip, female. **e, f**, *P. gressitti: e,* female genitalia; *f,* antenna tip, female. **g, h**, *P. adyscheres: g,* female genitalia; *h,* antenna tip, female.

Wing with base of R_s and M_2 complete; veins without brown spots at tips; ratio of $R_{2+3}:R_2:R_3 = 5:5:7$.

Genitalia as illustrated; subgenital plate strongly bilobed; genital digit elongate, bearing three spines apically.

Measurements: Holotype, antenna 0.8 mm.; wing length 1.4 mm.; wing width 0.6 mm. Paratypes, antenna 0.7-0.8 mm.; wing length 1.3-1.4 mm.; wing width 0.5-0.6 mm.

Holotype, female (US 64003), Mt. Unibot, Ton I., Truk, 200 m., light trap, Dec. 30, 1952, Gressitt. Paratypes (BISHOP), all Truk: Female, Ton, 32 m., Jan. 3, 1953, Gressitt; two females, Ton, 300 m., Feb. 4, 1953, Gressitt; five females, Ton, light trap, Jan. 4, 1953, Gressitt; female, Wena (Moen), 183 m., July 31, 1946, Townes; Mt. Chukumong (Teroken), Wena, 90 m., underside of banana leaves at light, Jan. 5, 1953, Gressitt.

DISTRIBUTION: Caroline Is. (Truk).

This species is most closely related to *adyscheres, quadrifilis,* and *rarotongensis* on the basis of the antennal structure, which is 15-segmented with 14 diminutive and fused to 13 in all these species. The only reliable character known to separate the four species, in the absence of males of *gressitti,* is the shape of the female subgenital plate. The plate of *gressitti* is distinctive in being somewhat elongate and deeply notched, a condition reminiscent of certain species of *Trichopsychoda.*

Dr. J. L. Gressitt's contributions to the Micronesian project have been invaluable. His field work in this small family has nearly doubled the amount of information available; this work pales to insignificance in comparison with the amount of productive effort he has expended on other aspects of the project. It is with pleasure that I recognize the major role he has played in the Micronesian project by naming this species in his honor.

31. Psychoda adyscheres Quate, n. sp. (fig. 24, *g, h*).

Male: Unknown.

Female: Vestiture uniformly gray colored.

Eyes separated by distance equal to 1.5 facets; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes nearly to upper eye margin, but not joining hair on vertex. Labellum with four teeth and two spines; ratio of palpal segments 8:10:10:14. Antenna with 15 segments; segment 14 small, may not be recognized as additional segment, broadly fused to 13, bearing setose tubercle, 15 pyriform, separated from 14; sensory filament Y-shaped.

Wing with base of R_3 and M_3 complete; veins without brown spots at tips; ratio of $R_{2+3}:R_2:R_3 = 6:5:7$.

Genitalia as illustrated; apical lobes very small, genital digit elongate, bearing single apical spine.

Measurements: Holotype, antenna 0.8 mm.; wing length 1.5 mm.; wing width 0.7 mm. Paratypes, antenna 0.8-0.9 mm.; wing length 1.4-1.7 mm.; wing width 0.6-0.7 mm.

Holotype, female (US 64004), Hill 1010, Kusaie, 300 m., light trap, Apr. 13, 1953, Clarke. Paratypes (US, BISHOP): Five females, same data as for holotype; female, Mutunlik (Yepan), Kusaie, 16 m., light trap, Jan. 24, 1953, Clarke; female, Mutunlik, Kusaie, 22 m., Jan. 26, 1953, Clarke.

DISTRIBUTION: Eastern Caroline Is. (Kusaie).

This species is an ordinary psychodid closely related to other *Psychoda* with antennal segment 14 diminutive; it can be distinguished only by the structure of the female genitalia. The subgenital plate is very small and essentially consists of only the two small apical lobes.

32. Psychoda longiseta Tokunaga and Komyo (fig. 25, *a-c*).

Psychoda longiseta Tokunaga and Komyo, 1954, Philippine Jour. Sci. **83**: 313 (type, male; Honshu, Japan).

Male: Specimens not available.

Female: Eyes separated by distance equal to about one facet; eye bridge with four rows of facets; frons covered with hair, band of hairs extending posteriorly between eyes,

but not joining hair area on vertex. Labellum with five teeth and three spines; ratio of palpal segments 8:10:12:15. Antenna with 16 segments, terminal three small, clearly separated from each other and preceding segment; sensory filament Y-shaped.

Wing as illustrated; radial and medial forks complete; ratio of $R_{2+3}:R_2:R_3 = 6:5:8$.

Genitalia as illustrated; subgenital plate with deep apical notch, heavily sclerotized, lyre-shaped structure on internal face of plate; genital digit long and cylindrical.

Measurements: Antenna 0.5-0.6 mm.; wing length 1.5-1.8 mm.; wing width 0.6-0.8 mm.

DISTRIBUTION: Japan, Bonin Is.

BONIN IS. CHICHI JIMA: 26, Futami-ko (Omura, Port Lloyd), May 10, 1956, Clagg.

The distinctive female genitalia of this species readily separate it from other Micronesian species. The plate is unique with the deep apical notch and the lyre-shaped structure on the internal face. Also, the radial fork is more distad from the medial than in most species of *Psychoda.*

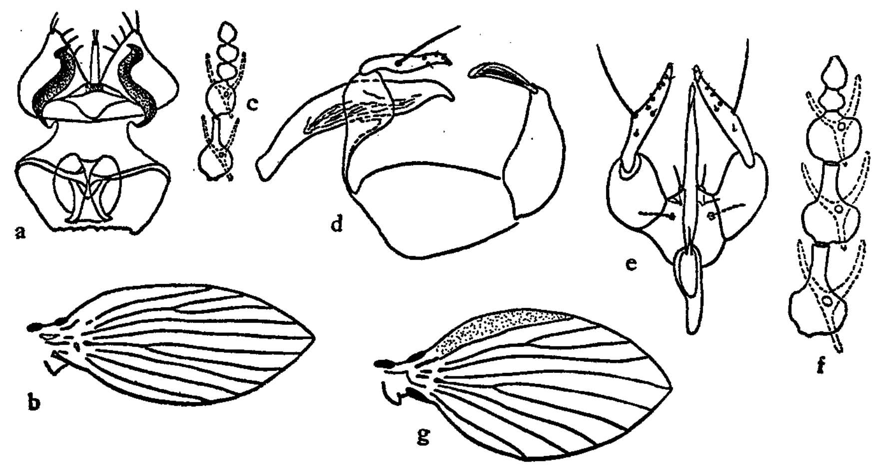


FIGURE 25.—a-c, *Psychoda longiseta: a,* female genitalia; *b,* wing, female; *c,* antenna tip, female. d-g, *P. allodapa: d,* male genitalia, lateral view; *e,* male genitalia, dorsal view; *f,* antenna tip, male; *g,* wing, male.

Specimens from Micronesia agree well with Tokunaga and Komyo's illustrations of critical characters. The wing, antenna, and female subgenital plate are very similar. The authors state that the wing of the female is "about 3 mm. long," which is considerably longer than the Bonin specimens and the ratio of the palpal segments differs somewhat from specimens examined, but these differences are not great enough to justify erecting an additional species.

33. **Psychoda allodapa** Quate, n. sp. (fig. 25, *d-g*).

Male: Pinned specimens not available.

Eyes separated by distance equal to about one-half a facet; eye bridge with four rows of facets, bridges connected with short suture; frons covered with hair, triangular patch

on mid-line extending posteriorly to level of first row of facets. Labellum with seven teeth and four spines; ratio of palpal segments 7:12:14:21, segments 2 and 3 enlarged. Antenna with 15 segments, terminal two reduced, clearly separated from each other and preceding segment; sensory filament Y-shaped.

Wing as illustrated; broad, with hairs on membrane as well as veins; radial and medial forks complete, ratio of $R_{2+3}:R_2:R_3 = 7:6:8$.

Genitalia as illustrated; surstyle short and stocky, with single tenaculum.

Measurements: Holotype, antenna 1.1 mm.; wing length 1.7 mm.; wing width 0.9 mm. Paratypes, antenna 0.9-1.2 mm.; wing length 1.7-2.2 mm.; wing width 0.9-1.1 mm.

Female: Unknown.

Holotype, male (US 63983), Bonin Is., Chichi Jima, Futami-ko (Omura, Port Lloyd), May 10, 1956, Clagg. Paratypes (BISHOP), all Chichi Jima, Bonin Is.: Ten males, same data as for holotype; male, Sakaiura, "Bull Beach," Apr. 5-25, 1958, Snyder; male, Yatsuse River, "Gen.'s Beach," Apr. 20-22, 1958, Snyder.

DISTRIBUTION: Bonin Is.

This species is markedly divergent from other species of *Psychoda* in the wing shape and vestiture of the membrane. However, the labellum with teeth, the 15-segmented antenna with two reduced apical segments, the short, stocky surstyle with its single tenaculum, the wing venation, and other structures indicate a fundamental relation with other species of *Psychoda*.

34. Psychoda harrisi Satchell.

Psychoda harrisi Satchell, 1950, Roy. Ent. Soc. London, Trans. **101**: 171 (type, male; New Zealand); 1953, Australian Jour. Zool. **1**: 374; 1954, Roy. Ent. Soc. London, Trans. **105**: 478.—Quate, 1954, Hawaiian Ent. Soc., Proc. **15**: 354.

Male: Eyes narrowly separated; eye bridge with four rows of facets. Labellum with four teeth and two spines. Antenna with 16 segments, terminal three reduced in size, 14 and 15 partly fused, 16 separate; sensory filament Y-shaped.

Wing: Ratio of $R_{2+3}:R_2:R_3 = 10:10:14$.

Genitalia with diststyle elongate, aedeagus terminating in ventrally curved, beak-like hook.

Measurements: Antenna 1.2 mm.; wing length 1.5 mm.; wing width 0.7 mm.

Female: Similar to male. Eyes separated by distance equal to two facets. Subgenital plate with pair of large, basal lobes extending laterally and apically from base of median lobe of plate, basal lobes about three-fourths as long as median lobe.

Measurements: Antenna 0.8 mm.; wing length 1.6-1.9 mm.; wing width 0.7-0.9 mm.

DISTRIBUTION: Hawaiian Is., New Zealand, Australia, western Caroline Is.

PALAU. BABELTHUAP: One, Ngaremeskang, 25 m., Dec. 20, 1952, Gressitt; one, Imeliik, light trap, June 6, 1957, Sabrosky.

The peculiar male aedeagus and female subgenital plate, as illustrated by Satchell (1950, *op. cit.*) and Quate (1954, *op. cit.*), readily separate this species from other Micronesian *Psychoda*.